NCTS Midterm Report, 2015/01-2017/06

National Center for Theoretical Sciences,
Mathematics Division

Contents

1 Overview

1.1 Report of Director

Since its establishment in the year 1997, National Center for Theoretical Sciences (NCTS) has provided the most important center for the collaboration and interaction among Taiwanese mathematicians. The main purpose of NCTS on one hand is to promote cutting-edge research in theoretical sciences, and on the other hand, to serve as an platform for students, young mathematicians and researchers in the relative fields for idea exchange and collaboartion.

The achievement of NCTS was remarkable. After serving the community for almost 20 years, NCTS has completely changed the mathematical society of Taiwan. It is generally believed that NCTS is the key factor for the great improvement of the mathematical research in Taiwan.

Since January 2015, NCTS was restructured and the Mathematics Division was moved to the campus of National Taiwan University. With the generous support of NTU and active researchers in mathematics and related areas, NCTS's academic activities were impressive domestically and internationally. Especially, we encourage visitors for a longer stay for more solid collaboration. Statistics show that the total duration of foreign visitors increased from about 3000 days per year to about 5000 days per year. The increasing number of research articles jointly by Taiwanese mathematicians and visitors provides another evidence.

We in fact consider 2016 as a year of collaboration for NCTS, marked by strengthened research collaboration both domestically and globally. Here are a short list of efforts on international and domestic cooperation we made during the past three years.

- In cooperation with MSRI at Berkeley, we are going to run a joint Summer School in 2019 on Toric Varieties.
- We worked with Institute of Mathematics of Academia Sinica, Taiwan, and organized Taipei Postdoc Seminar for postdocs and young researchers, starting from 2016.
- Thanks to the cooperative programs with partner institutes, including KIAS in Korea, RIMS in Japan, Fields Institute in Toronto and PIMS in Vancouver, we sent young researchers to these institutions for research visits of one month or more.

We launched a *Laboratory of Data Science* of National Center for Theoretical Sciences in 2016. This is in response to the increasing need of the society to the emerging fundamental challenges in data science. The main goal of LDS of NCTS is to study the mathematical models for data processing in medical research. The current research group consists of pure and applied mathematicians, statisticians, physicians and more. Other

than project-oriented small group meetings, the Forum of Data Science is organized every month as a platform for mathematicians, statisticians, physicians and other experts to gather for idea exchange and problem solving. There are already some other collaborations initiated by this program ongoing.

Youth training and youth empowerment have been the major goal of NCTS since its foundation. Many of our new generations, both math majors and non-math majors; both Taiwanese and international students, have benefited from our large variety of summer courses and boot-camps. Each year, we organized about 10 summer schools whose topics have covered geometry, elliptic curves, probability, mathematical biology, optimization, etc. Students are highly encouraged to attend the intensive and research-oriented lectures given by both Taiwanese local and international visiting scholars, which are unique and different from their usual curriculum.

Other than organized summer schools, we initiated a *Undergraduate Summer Research Program*, USRP for short, in 2017. The purpose of the program is to attract undergraduate for fundamental advanced research by providing a guided project-oriented research projects. Among almost 30 applicants, 13 are selected to form four teams. They are asked to carry out some hand-on research projects during the upcoming summer.

We are working on integrating the human resources in Taiwan by forming the *Taiwan Math School*. The goal is to integrate researchers and students in related fields to form a more solid curriculum for students. One of the basic format is to have intensive advanced courses offered by world leading experts in summer or in some specific time. While the local people work on some basic prerequisite materials in regular semester. By doing so, we expect that both researchers and students will have more solid collaboration and broader view toward frontier research.

1.2 Brief Summary of Programs

1.2.1 Visitors and NCTS Scholars

Short-term and Long-term Visitors

NCTS host hundred of visitors from all over the world. It become a more and more attractive research center for foreign visitors. Other than those who come for a workshop or conference, we particularly encourage our members to invite visitors for longer stay, as this helps create more discussion and interaction between visitors and local researchers. We believe that this is an effective way to enhance research collaboration. Statistics show that both the number of visitors and total duration of their visits are increasing significantly. During the year of 2012 (resp. 2013, 2014), the Mathematics Division of NCTS host 255 (resp. 269, 307) visitors of total 2405 (resp. 3055, 3162) days. During the first half of the Phase IV, the Mathematics Division of NCTS host 269 (resp. 407, 185) visitors of total 3615 (resp. 5159, 2940) days in the year of 2015 (resp. 2016,

2017 updated to June 20).

Visitors of NCTS contributed to the center in various forms. Here are some examples:

- Kazuo Aoki from Kyoto was appointed as visiting professor since Apr. 2016. With his assistance, the local young research group of Kinetic Theory consists of Kung-Chien Wu (NCKU), Hung-Wen Kuo (NCKU) and Jing-Cheng Jiang (NTHU) is now become a very active and promising group.

- Loring Tu from the States spent his sabbatical semester at NCTS in Spring of 2017. During his stay, he gave a course *Introduction to Equivariant Cohomology* for 9 weeks, which is a very popular intensive course.

NCTS Scholars

NCTS Scholar is a program to recruit world leading experts to work in NCTS for 3 to 6 months during a span of three years, and they are free to choose their period of visit. During the first half of the Phase IV, we successfully recruited several top mathematicians through this program. For example, an top algebraic geometer Caucher Birkar (Cambridge), who is an NCTS scholar, made important breakthrough in minimal model program by proving the BAB Conjecture. His work was done when he was here in Taipei. Another example is Yenhsi Richard Tsai who helped the local research group of Yu-Chen Su (NCKU) and Chun-Hao Teng (NCHU) by visiting NCTS regularly once a month for three consecutive years.

Previous and current NCTS Distinguished Scholars includes: Yujiro Kawamata (Tokyo, algebraic geoemtry), Richard Schoen (Stanford, geometry), Horng-Tzer Yau (Harvard, probability), Fan Chung Graham (UC San Diego). The list of NCTS Scholars consists of: Yen-Hsi Richard Tsai (UT Austin, applied math), Albert Fan-Jiang (UC Davis, applied math), Caucher Birkar (Cambridge, algebaic geometry), Paolo Cascini (Imperial College, algebraic geometry), and Nikolaos Zygouras (University of Warwick).

We quote some word from the report of NCTS Scholar Caucher Birkar reflecting the operation of the program, he said *"I believe NCTS is going in the right direction by appointing scholars who regularly visit the center and who attract other visitors. Scholars are asked to give lectures and organize conferences which is quite reasonable and necessary. A really positive thing about NCTS is the lack of bureaucracy for scholars."*

1.2.2 Postdoctoral Program

One of the main goal of NCTS is the to train younger generation. Therefore, it is fundamental important to have a solid postdoc program. We aim to be the training camp for postdocs so that they are able to advance their pursuit of higher advanced

research. In fact, our postdoc program is quite international. Not only many of our postdocs are international postdocs, but also many of our postdocs received positions from other countries. For example, Chih-Whi Chen, who received his Ph.D from NTU, got an offer at Uppsala, Sweden after working as NCTS postdoc for a year. Another example is Jia-Rui Fei, who received a tenure-track position at Shanghai Jiao-Tung University after working as NCTS postdoc for two years.

As a summary, we allocated 20 positions of postdoc fellows. In the year 2015, we had 17 postdocs. Then 5 of them have now received positions from other institutions, such as Hiroshima Univ. of Japan, NYU at Shanghai, Wu Han Univ. and NCKU. In the year of 2016, we got the 12 renewed postdocs and 8 new postdoc. Then by the end of the academic year, 6 of them received positions from other institution, including Uppsala Univ. of Sweden, Adelaide Univ. of Australia, Shanghai Jiao-Tung Univ., Chinese University of Hong Kong, National Taiwan University and NCTU. There are 3 of them whose term are terminated. There are 7 newly hired postdocs this year, hence there will be 18 postdocs in the academic year of 2017.

Each of NCTS Postdoc Fellow is assigned to an adviser and to a Topical Program. By doing so, each postdoc is involved in various activities of NCTS. Other than those seminars and events of each Topical Program, we have launched the cooperative project Taipei Postdoc Seminar with Academia Sinica. This seminar is jointly organized by postdoc representatives from NCTS and AS. It not only provides an opportunities for postdoc fellows to present their works, but also build a platform for them to seek for possible collaborations.

1.2.3 Graduate and Undergraduate Program

NCTS Research Assistant

We allocated 10 positions of Student Research Assistants for students who are in the transition toward their advanced studies. Each semester we open call for applications and the selection criteria is basically the potential of students to be admitted by prestigious Ph.D. program or not. Similar to Postdoc Fellows, each RA is associate to a topical program and a mentor. Moreover, they are required to take courses and participate seminars in their fields.

In the academic year of 2015, we had 5 RAs. Among them, 2 of them was admitted to Ph.D. program in the US and another one went to CUHK for Ph.D. In the academic year 2016, we have 3 RAs, working on number theory, differential geometry and PDE respectively. There were then go to Germany, USA and Canada for Ph.D. studies. In the year of 2017, we will have 8 RAs.

NCTS Undergraduate Summer Research Program

In order to attract more students for advanced studies and research in mathematics, we inaugurated a Summer Research Program starting from 2017. We think that it is a good idea for young students to have some experience of doing mathematical research.

We first called for proposal of projects from professors and researchers. Then we called for applications of students. In the year of 2017, we plan to selected 4 research projects with 14 students in total. We are delighted to learn that the student applicants are quite diverse, from 8 major universities and one from the States. We selected 13 students out of 30 applicants.

1.2.4 International Cooperation

Cooperation with International Institutions

There are several existing cooperation program with international institutions. Other than those existing one, a lot of extra efforts were made in order to build up further cooperation with international institutions during the past three years.

a. RIMS, Japan
   The MoU with RIMS was signed in 2014. Base on the MoU with RIMS, we recommend two young researchers: Y. N. Peng (NCU) and Chien-Hung Cho (CCU) to visit RIMS for one and two months respectively in 2016. And we recommend River Chiang (NCKU) to visit RIMS for one month in 2017.

b. KIAS, Korea
   The MoU with KIAS was signed long time ago. We carried out the MoU by recommended a postdoc fellow to visit KIAS for one month in 2016.

c. Bergen, Norway
   We hosted a group of mathematicians from Bergen, Normay, who visited NCTS in 2106. We renew the existing MoU with Univ. of Bergen.

d. PMI, Korea
   The joint NCTS-PMI workshop has been held annually for years. The most recent one was held in 2016. It was a joint workshop on number theory that was held in Pohang.

e. MSRI, USA
   The Mathematical Sciences Research Institute (MSRI) is a successful center with long history, and we started to discuss with MSRI this May for possible cooperation. After the discussion lasting for several months, we are going to run a joint summer school held at NCTS, which is confirmed to be on Toric Varieties in Jul 29 (Mon)-Aug 9 (Fri), 2019. MSRI will provided lecturers and partial support of American participants.

f. PIMS, Canada
   The Pacific Institute of Mathematical Sciences (PIMS) is an Canadian Institute with its hub at University of British Columbia. There are some common interests in

the field of analysis an differential geoemtry. An MOU has been signed in 2016 in order to promote the collaboration between these two research groups and the networking of some other fields are still being developed.

g. Fields Institute, Canada
We have started an exchange program with the Fields Institute based on the newly signed MOU in 2017. According to the program, we will be able to send young researchers as well as senior researchers for exchange and collaborations, and vice versa. In the year of 2017, we send a postdoc fellow to Fields for one month. Their Director Ian Humbleton will visit NCTS in December.

h. AIMS, USA
The American Institute for Mathematical Sciences run a large scale conference on differential equations and dynamical systems every two years. The conference was arranged in Orlando in 2016, and NCTS is going to host the next meeting in 2018, by cooperating with AIMS.

Other International Programs
There are some more international cooperation programs supported by NCTS. We found it very effective to have NCTS as the supporting center for active research groups. Without a center like NCTS, it would be extremely difficult for research group to build up solid and long-term partnership with international groups. We list some of the existing programs supported or coordinated by NCTS.

- ReaDiNet
  This is a program on Reaction-Diffusion equation bringing active research groups in France, Japan, Korea, China, and Taiwan together.

- East Asian Core Doctoral Forum on Mathematics
  This is a meeting for Ph.D. to present their work for international collaboration. It consists of Ph.D students from Tokyo University, Kyoto University, and Tohoku University of Japan, Seoul National University of Korea, Tsing Hua University and Fudan University of China. Taiwanese Ph.D. students are mainly from NTU, NTHU, NCTU, NCU and is organized by NCTS.

- Bilateral workshops, such as Younger Generation in Algebraic Geometry, Japan-Taiwan Joint Conference in Number Theory, Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics.

1.2.5 Taiwan Mathematics School

We are working on integrating the human resources in Taiwan by forming the *Taiwan Mathematics School*. The goal is to integrate researchers and students in related fields to

form a more solid curriculum for students. One of the basic format is to have intensive advanced courses offered by world leading experts in summer or in some specific time. While the local people work on some basic prerequisite materials in regular semester. There are two possible challenges and two opportunities. We hope that the courses offered by this program can be credited to students and recognized as certain teaching duties of participating faculties. Therefore, not only both students and faculties have more solid collaboration and broader view toward frontier research, but also what they done here will be counted toward their curriculum and regular teaching duties. However, the challenges mainly consists the bureaucracy of various institutions.

The group of Scientific Computing has formulated certain framework for the Taiwan Mathematics School. The group of Differential Geometry and Algebraic Geometry also has solid foundation of existing cooperation, which can serve as bases for the School.

1.3 Highlights of Activities

During the past three years, we hosted about 30 courses and lectures and about 40 workshops and conferences each year. The number of workshops and conferences are about the same scale of NCTS previously. The number of courses and lectures are increasing in recent years. This phenomena is consistent with the policy of encouraging visitors for longer stay. We especially encourage our group members to invite leading experts for longer visits and to give mini-courses during their stay. This is part of the reason that number of courses are increasing.

Among those activities host by NCTS, we should like to mentioned the following events of NCTS.

Highlights of Activities of 2015

- NCTS Distinguished Lecture Series by Fan Chung Graham
  Fan Graham took her sabbatical leave and visited NCTS as Distinguished Scholar in Fall of 2015. During her visit, she gave a course on Spectral Graph Theory. Spectral graph theory was used widely in data sciences and Fan Chung is a world leading expert of this exciting field. The course was a very popular one among students and young researchers.

- 2015 East Asian Core Doctorial Forum on Mathematics
  This is an event co-organized by several professor from Japan, Korea, Taiwan and Chine. The purpose is to provide a platform for Ph.D. students from these four countries to present their research work and to make academic friends.

Highlights of Activities of 2016

- Prof. John Coates is a world renown number theoretist. During his visit in July

of 2016. He gave a distinguished lecture series: On the Conjecture of Birch and Swinnerton-Dyer for Quadratic Twists of $X_0(49)$.

- In March and April of 2016, there are several leading algebraic geometers visited NCTS and gave mini-course. These including Paolo Cascini (Imperial), one of the author of the milestone work of the existence of minimal model program, Yujiro Kawamata (Tokyo) who is a leader of algebraic geometry in the past 30 years, and MAsayuki Kawakita (RIMS, Japan). Their courses made NCTS in the spotlight and attracted several postdocs and Ph.D. students from abroad to participate these events.

- The 7th Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics
  This was a very successful workshop attracted more than 50 young researchers from major universities in Japan and Taiwan.

- NCTS Short Courses on High-Performance Linear System Solvers
  This is joint course organized Wen-Wei Lin, Weichung Wang and Tsung-Ming Huang. Not only the material of the course is interesting, but also the course was live-casted to NSYSU. Consequently, there are more courses or events were broadcasted to other locations such as NCKU at Tainan, NTHU at Hsinchu and NSYSU at Kao-Hsiung after that.

Highlights of Activities of 2017

- NCTS Workshop on Singularities, Linear Systems, and Fano Varieties
  Caucher Birkar was NCTS Scholar during 2014-2016. During his visits to NCTS, he worked out the first part of his series of work on minimal model program which leads to the solution of the famous Borisov-Alexeev-Borisov Conjecture, which is considered to be the most important work in algebraic geometry in recent years. The workshop was organized to go into details of his breakthrough. A volume contributed by international speakers and participants will be published, possibly by American Mathematical Society, to record this work and this workshop in Taipei.

- 2017 NCTS Mini-Workshop on Geometric Analysis
  This workshop was co-organized by local geometers Mao-Pei Tsui and NCTS Distinguished Scholar Richard Schoen. Rick Schoen was announced winner of Wolf Prize during his visit in NCTS. The Prize laureates celebrated his memorial moment with members of NCTS.

- NCTS Spring Day and Taipei Postdoc Seminars
  NCTS Spring Day was designed for postdocs and recipient of young theoretical

scientist award. It is an occasion for senior members to know more about the research interests of younger generation.

Taipei Postdoc Seminar is another activities for younger researchers. It is a seminar organized by postdocs of NCTS and Academia Sinica to promote the discussion and collaboration between postdocs.

1.4 Highlights of Research Achievement

We list some of highlights of research achievement of our key members.

- Anticyclotomic Iwasawa theory for modular forms
  During 2015-2016, we successfully extend the work of Bertiloni-Darmon on the anticylotomic main conjecture for elliptic curves to elliptic modular forms. We construct anticyclotomic p-adic L-functions for modular forms and prove the vanishing of its mu-iinvariants [CH15b]; we prove one-sided divisibility in the anticyclotomic main conjectures for modular forms [1]. In addition, in [3] we construct Euler system for generalized Heegner cycles and prove the corresponding Perrin-Riou's explicit reciprocity law, with which we obtain some new examples of Bloch-Kato conjectures under some p-ordinary hypothesis. We carried out the first step in our project on Yoshida congruences for Siegel modular forms of genus two. In [4] prove the non-vanishing modulo p of Yoshida lifts by computing the Bessel peirods of Yoshida lifts and using main results of [2]. As a consequence, we give a new proof of the non-vanshing of Yoshida lifts. Our next step is to elaborate the computation of the Petersson norm of Yoshida lifts by Rallis inner product formula as well as construct Hida families of Yoshida lifts.

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[2] M. Chida and M.-L Hsieh, Special values of anticyclotomic L-functions for modular forms. To appear in Crelle's journal.

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[4] M.-L. Hsieh and Namikawa Kenichi, Bessel periods and the non-vanishing of Yoshida lifts modulo a prime. To appear in Mathematische Zeitschrift.

- Multiple zeta values in positive characteristic
  In [1], we consider the positive characteristic analog of the question for classical

MZV's: is there any criterion to determine when a given MZV is Eulerian? This question in the classical setting is only known by Brown, who provides a sufficient condition. In the paper [1], we give an effective criterion for the analogous problem in the function field case. In the classical theory of MZV's, computing the dimension of the space of the same weight double zeta values is a very difficult problem. In fact, the dimension is unknown when the weight is higher than 4. In [2], we establish an effective criterion or algorithm to compute the dimension of the space of double zeta values in positive characteristic. We determine the dimensions via special points and logarithms, which give completely new points of view.

References

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[2] C.-Y. Chang, Linear relations among double zeta values in positive characteristic, to appear in Cambridge Journal of Mathematics.

- The classification of immersed, connected, umbilic hypersurfaces in the Heisenberg group H_n with $n \geq 2$

In a series of papers, Jih-Hsin Cheng, Hung-Lin Chiu, Jenn-Fang Hwang and Paul Yang have showed that such a hypersurface, if closed, must be rotationally invariant up to a Heisenberg translation. Moreover, they proved that, among others, Pansu spheres are the only such spheres with positive constant sigmak curvature up to Heisenberg translations. This is the first paper dealing with characterization of Pansu spheres in H_n with $n \geq 2$. They are revising the Strong maximum principle (SMP) techniques used in their earlier works and they have extended the SMP to a very general setting including mean curvature operator in subriemannian geometry. It is expected that these tools can be used to studied other problems in subriemannian geometry.

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[3] J.H. Cheng (with Chiu H.-L., Hwang J.-F., Yang P.) Strong Maximum principle for mean curvature operator on subriemannian manifolds, (preprint), 0-0(arXiv:1611.02384)

- Linearized Boltzmann equations
  Kung-Chien Wu considers the linearized Boltzmann equations in a torus for non-smooth initial perturbations [1,5]. And then study the nonlinear stability [3]. This idea comes from the famous result by Tai-Ping Liu and Shih-Hsinn Yu for Green function of the linearized Boltzmann equation (CPAM, 2004). Our result reveals both the fluid and kinetic aspects of this model. The Mixture Lemma plays an important role in constructing the kinetic-like waves, and we supply a new proof without explicit solution of the damped transport equation. This extension can help us construct the pointwise estimate of the Fokker-Planck Boltzmann equation [4].

References

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[2] A. Jungel*, C. K. Lin and K. C. Wu, An incompressible limit for a Navier-Stokes system with capillary effects, Comm. Math. Phys. 329 (2014), 725-744.

[3] K.C. Wu, Nonlinear stability of the Boltzmann Equation in a periodic box, J. Math. Phys., 56 (2015), 081504.

[4] K.C. Wu, Pointwise discription for the linearized Fokker-Planck-Boltzmann Model, J. Stat. Phys., 160 (2015), 1277-1293.

[5] F.C. Li and K. C. Wu*, Semigroup Decay of the Linearized Boltzmann Equation in a Torus, J. Differential Equations, 260 (2016), 2729-2749.

- Diffusive sensor fusion signal processing framework with an application to the automatic sleep dynamics annotation

  The research team led by Hau-Tieng Wu (Toronto/Duke) is very active in various application to medical problems. One of their project is to find proper model for the nonlinear dynamics and an associated algorithm. This is the key step toward a more delicate understanding of different physiological dynamics, which could

lead to a more accurate sleep dynamics evaluation. Manifold is a natural low dimensional model suitable to host such a nonlinear dynamical system, although in general it is not possible to explicitly write it down. The problem is further complicated by the nonlinear relationship between different channels and the undesired nuisance parameters with the possibly nontrivial topology. The lately developed common manifold model, and the alternating diffusion, pioneered by the co-PI Hau-tieng Wu, (cf. [1,2]) is suitable for this kind of problem and has been successfully applied to several problems in the last year (cf. [3,4]).

References

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[3] R. Lederman & R. Talmon & H.-T. Wu & Y.-L. Lo & R. R. Coifman, Alternating diffusion for common manifold learning with application to sleep stage assessment, ICCASP, 2015

[4] O. Katz & R. Talmon & Y.-L. Lo & H.-T. Wu, Diffusion-based nonlinear filtering for multimodal data fusion with application to sleep stage assessment, submitted

1.5 Summary of Demographic Data

1.5.1 Summary of Activities

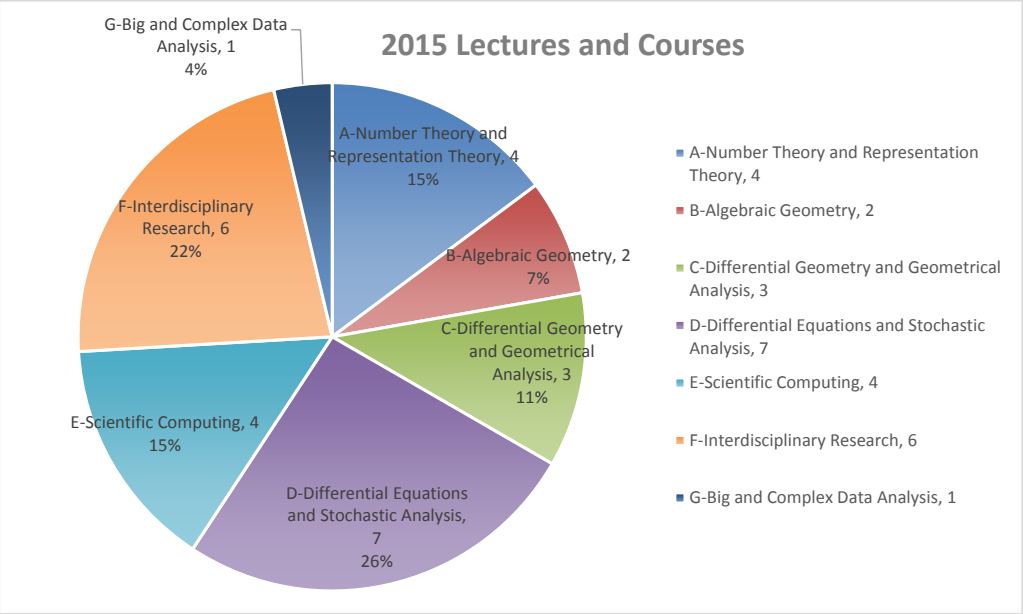


Figure 1-1. 2015 NCTS Lectures and Courses

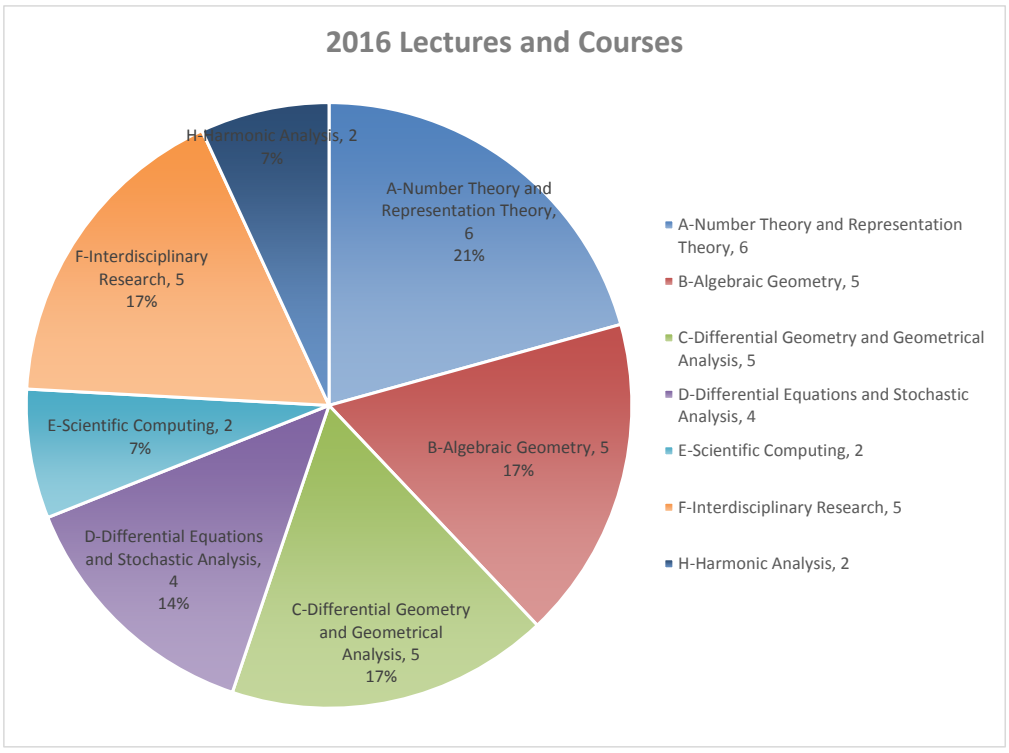


Figure 1-2. 2016 NCTS Lectures and Courses

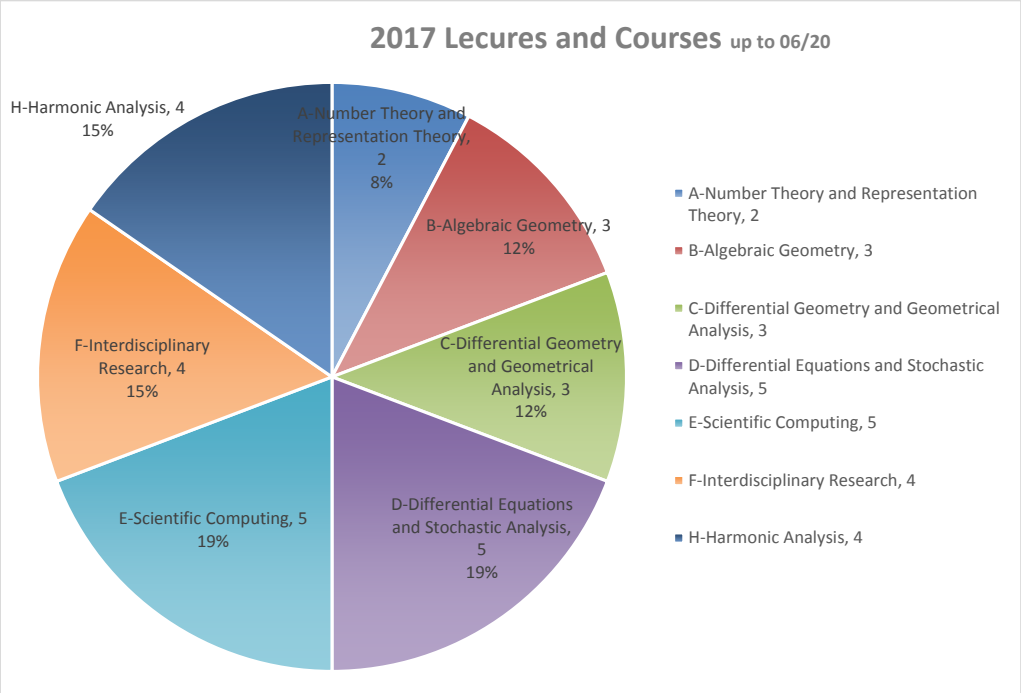


Figure 1-3. 2017 NCTS Lectures and Courses

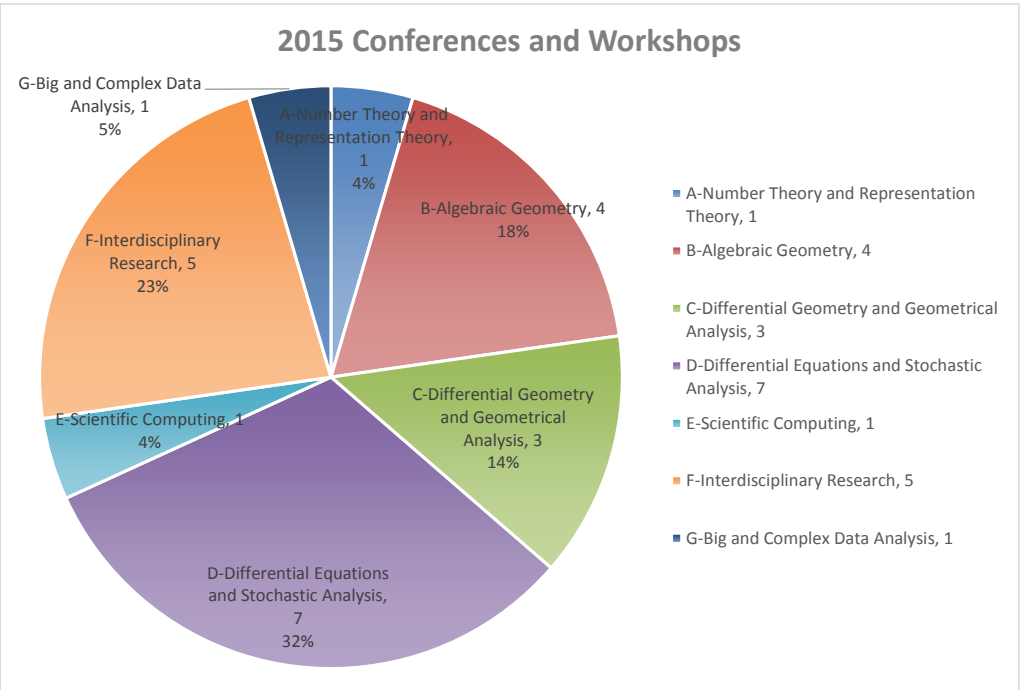


Figure 1-4. 2015 NCTS Conference and Workshop

Figure 1-5. 2016 NCTS Conference and Workshop

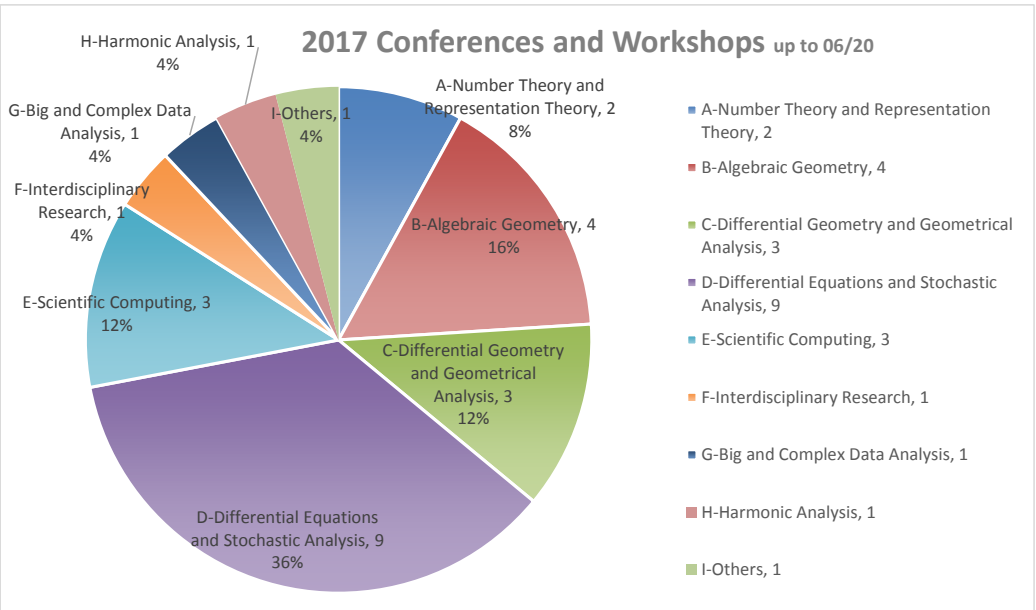


Figure 1-6. 2017 NCTS Conference and Workshop

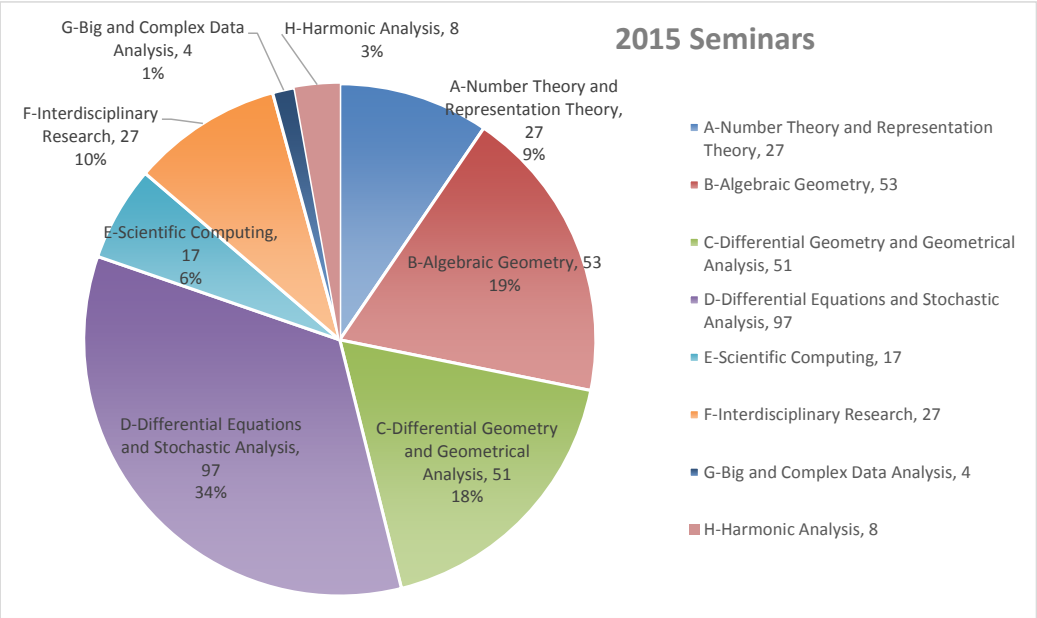


Figure 1-7. 2015 NCTS Seminars

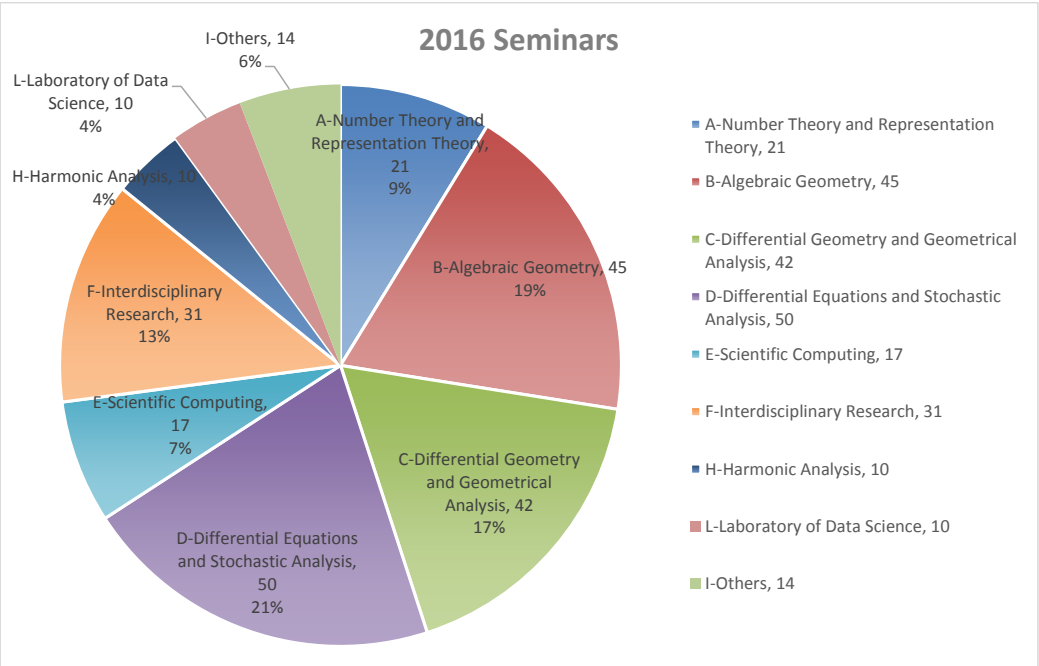


Figure 1-8. 2016 NCTS Seminars

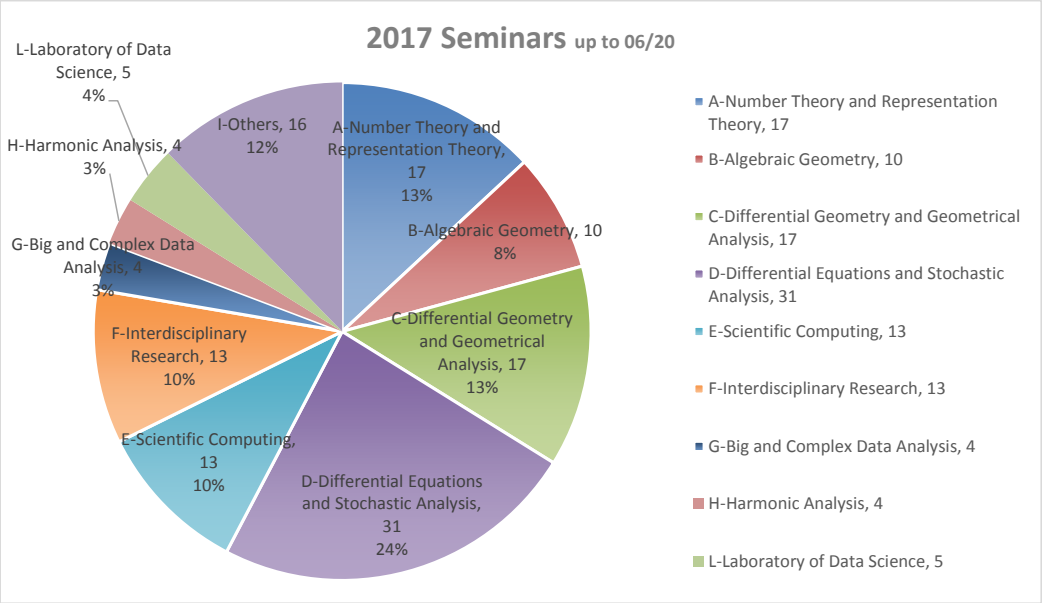
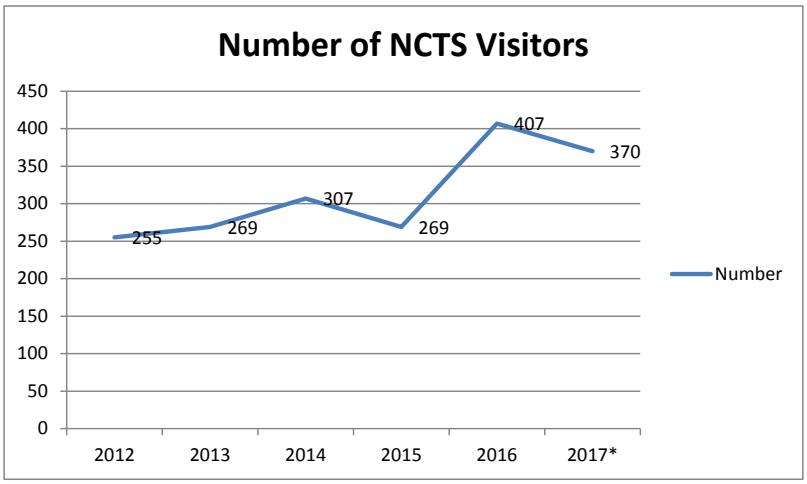
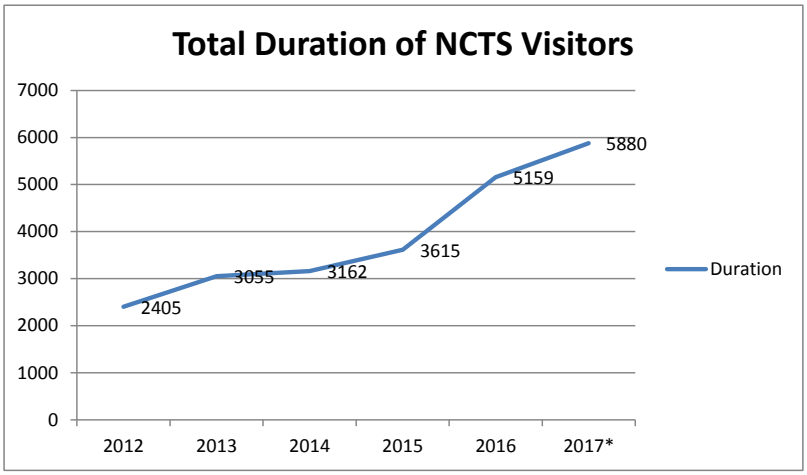


Figure 1-9. 2017 NCTS Seminars

1.5.2 Summary of Visitors



The number of 2017 is estimated by using (the actual number up to 06/20)*2



The number of 2017 is estimated by using (the actual number up to 06/20)*2

Figure 1-10. Summary of NCTS Visitors

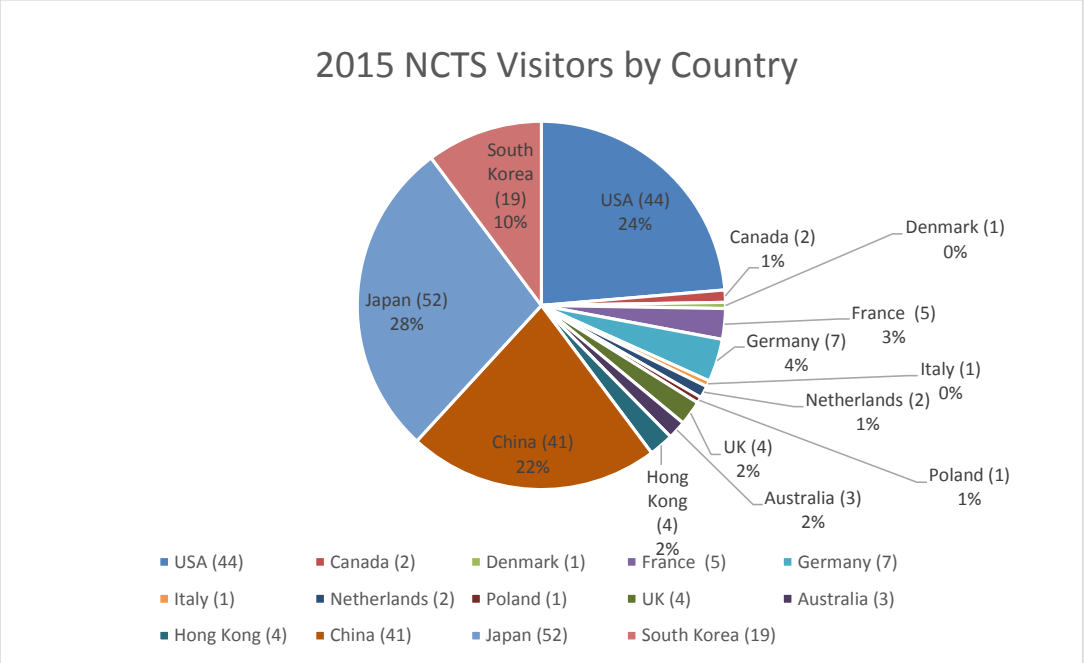


Figure 1-11. 2015 NCTS Visitors by Country

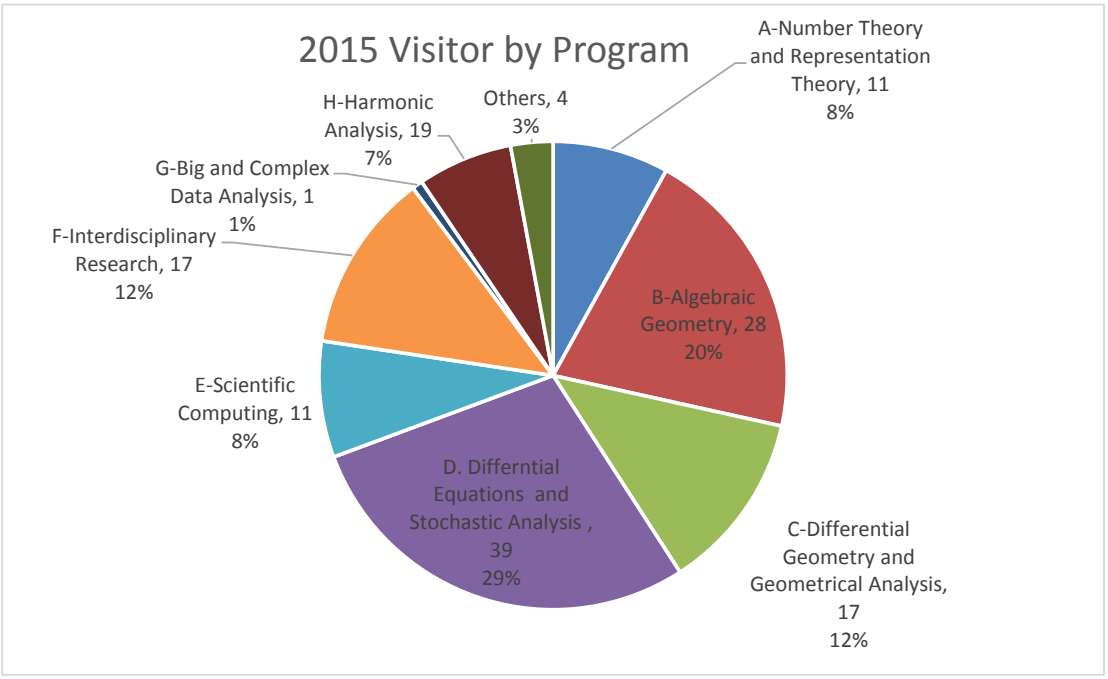


Figure 1-12. 2015 NCTS Visitors by Program

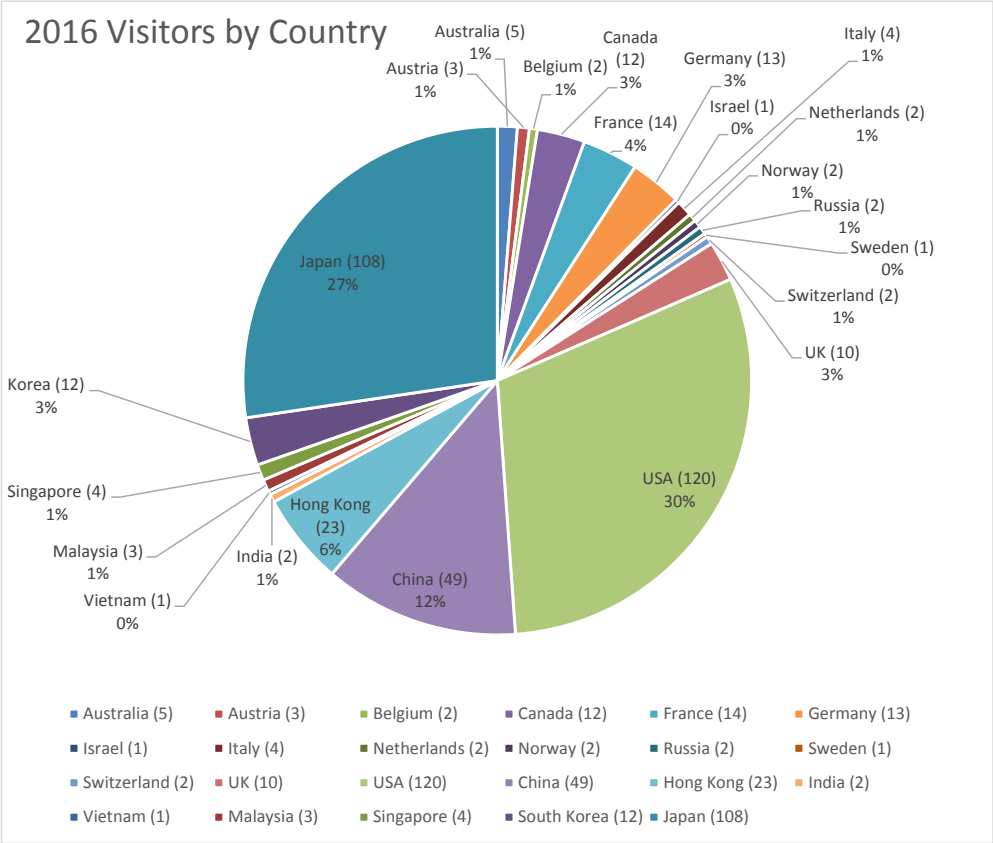


Figure 1-13. 2016 NCTS Visitors by Country

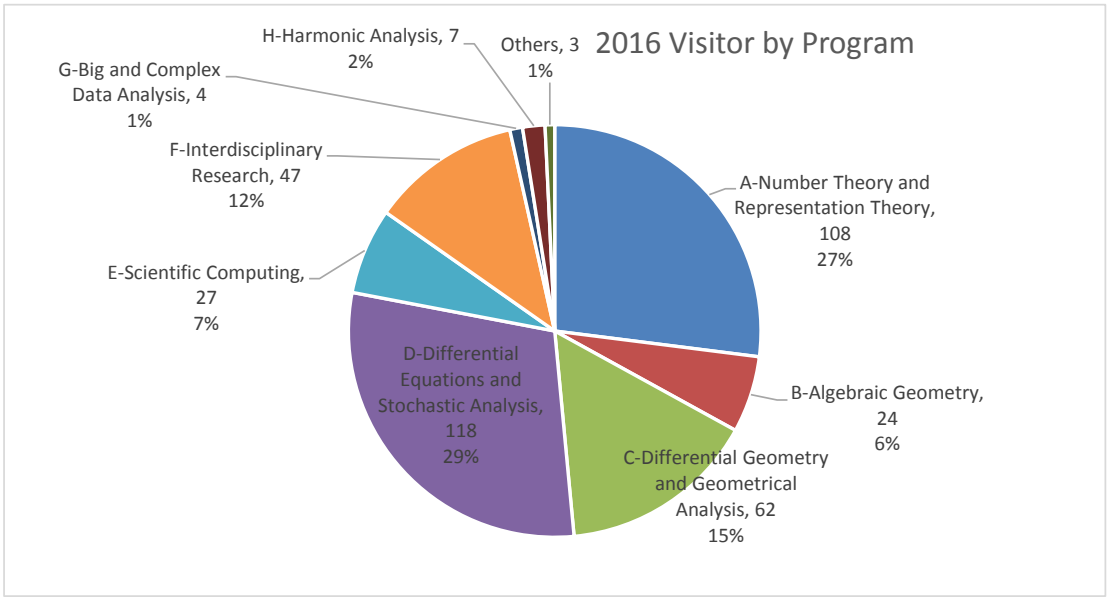


Figure 1-14. 2016 NCTS Visitors by Program

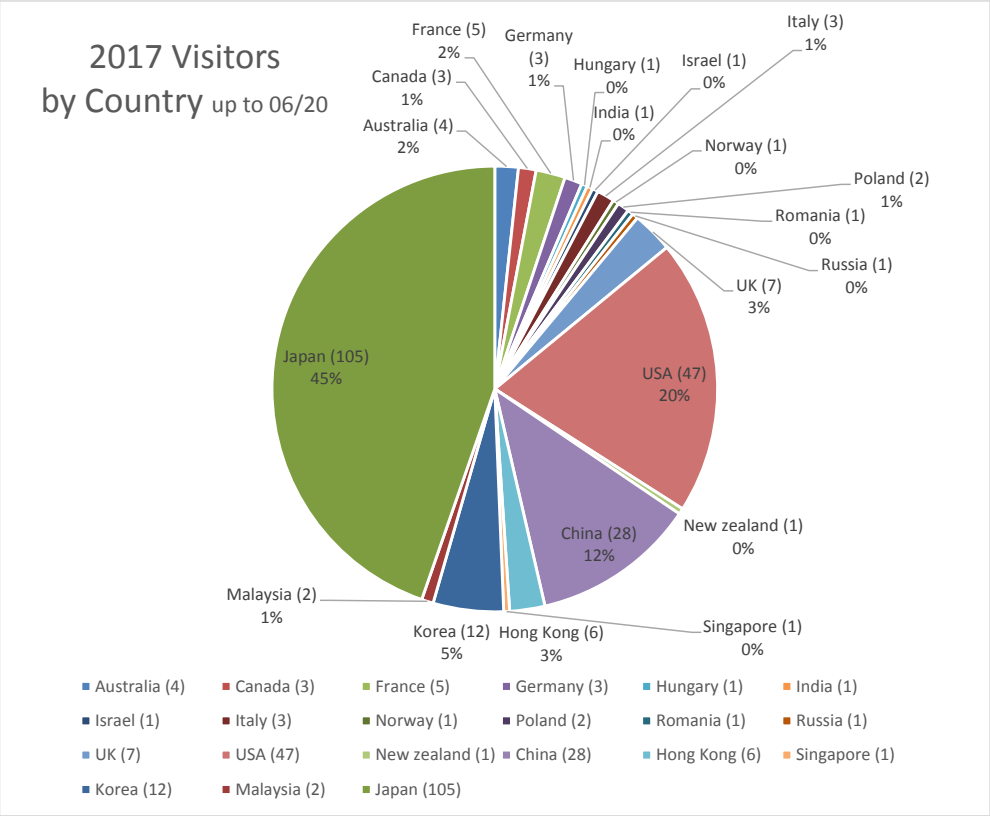


Figure 1-15. 2017 NCTS Visitors by Country

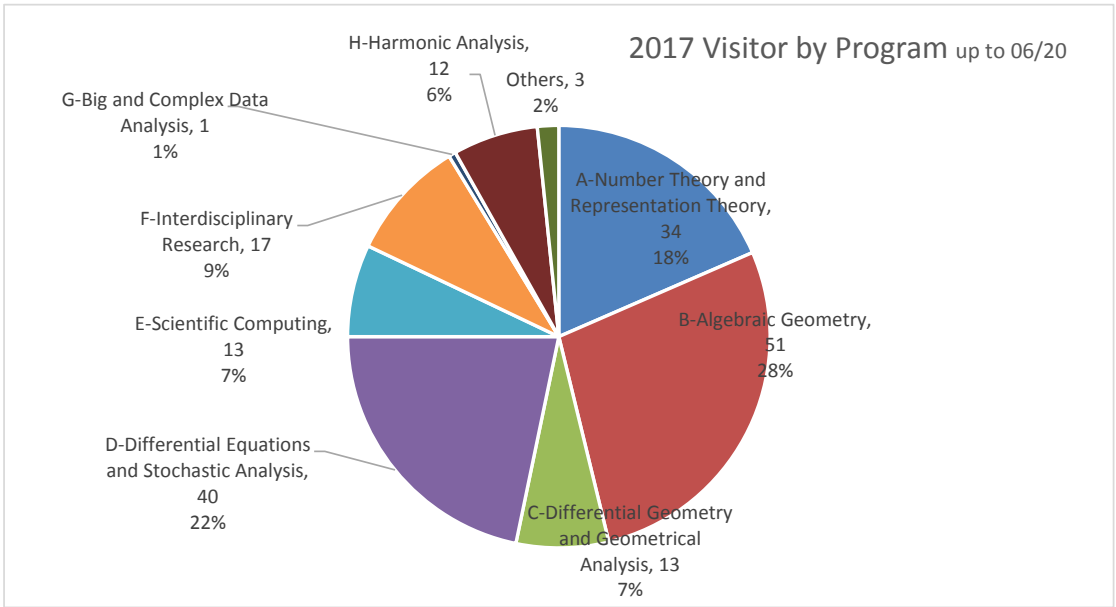


Figure 1-16. 2017 NCTS Visitors by Program

1.5.3 Summary of Publication Data

The following chart shows the publications related to NCTS. There are several possible relations in consideration. First of all, "Key Members" includes the publications of postdocs fellows, Executive Committee and Scientific Committee members. While "Affiliate to NCTS" counts only those above publications which list NCTS as (one of) its affiliation. The category "Acknowledge NCTS" counts those above publications which acknowledge NCTS together with those publications of visitors which acknowledge NCTS.

We consider the increasing number of publications reflecting more active Topical Programs, more solid postdoc program and stronger tie with our visitors.

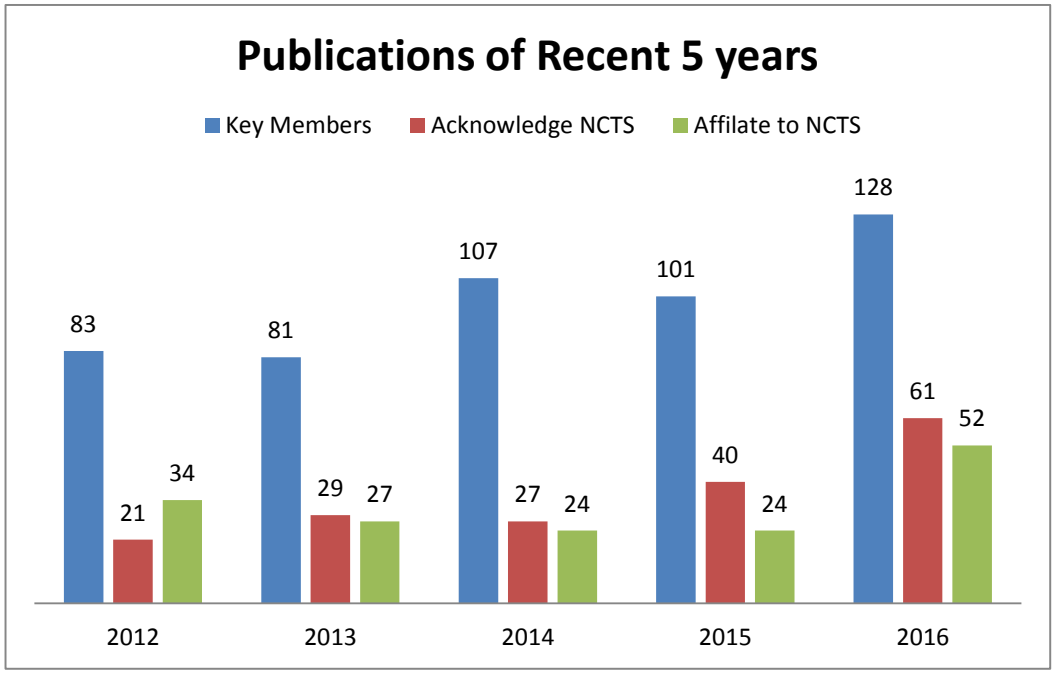


Figure 1-17. Publications of Recent 5 years

1.5.4 Summary of Budget and Expenses

Below please find the table which summarized the budget and expenses of the year 2015 to now.

Expenses	**2015**	**2016**	**2017 up to 05/31**	**2017 Estimated**
Perseonnel (staff)	5475070	6054901	3237641	6475282
Research Stipend	2295000	3676167		3500000
Personnel (researchers)	12456623	17435473	9456681	18913362
Visitors	13199360	20472634	5297100	18010140
Activities and Maintaince	5529949	5758732	3223213	7735711
Equipment	1435524	794482	800000	6600000
Travel	2878610	2810370	837681	2848115
Overhead	3498000	3133000	428632	2174468
Total	46768136	60135759	23280948	66257079

Table 1-1. NCTS Expenses [1]

Sources	2015	2016	2017
MOST	37103144	42564645	40000000
NTU	8222226	14329280	16800000
Remnant	1442766	3241834	9457079
Total	46768136	60135759	66257079

Table 1-2. NCTS Budget Sources

[1] In the sector of Equipment and Maintenance of 2017, we allocated some more budget for relocation of the Center to new building, expected the end of the year 2017

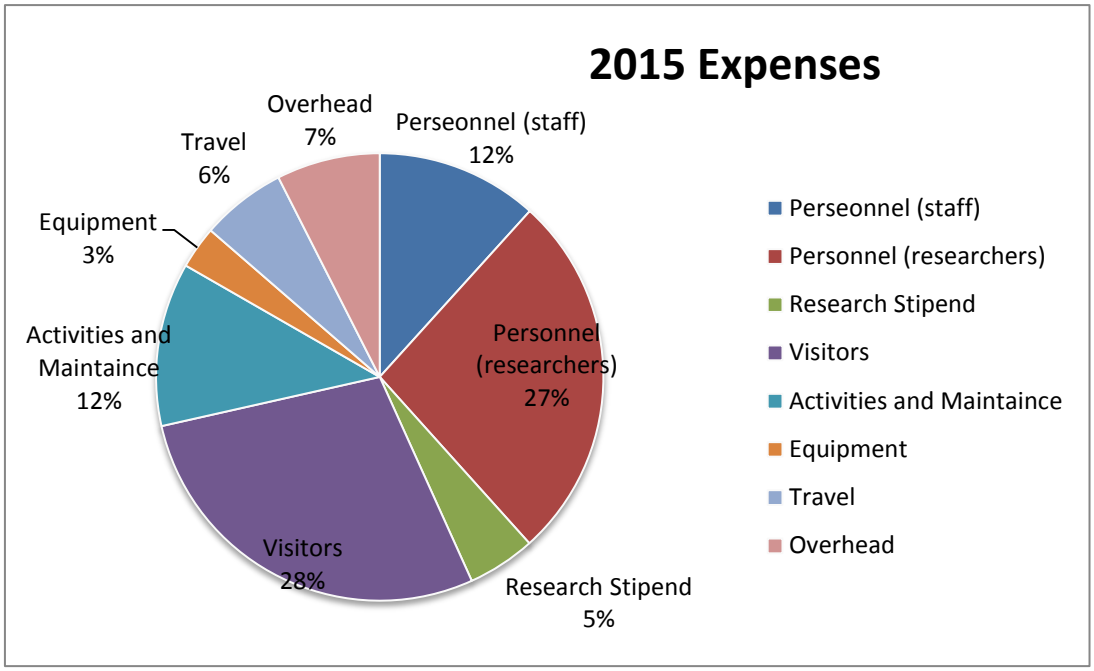


Figure 1-18. 2015 NCTS Expenses

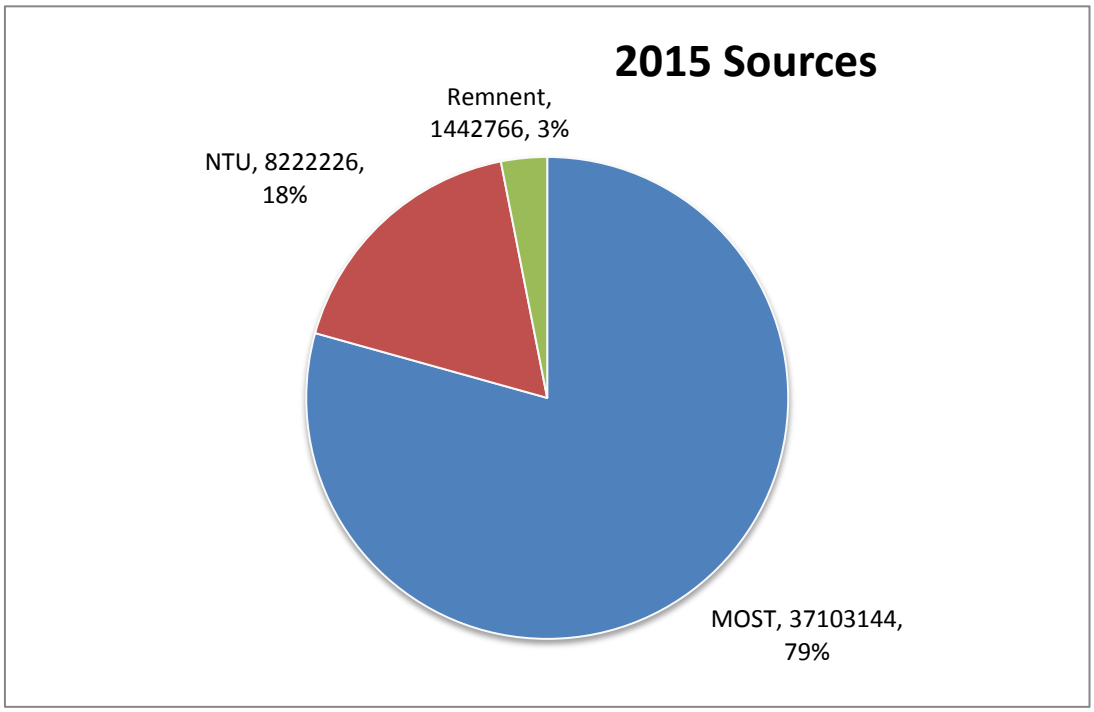


Figure 1-19. 2015 NCTS Budget Sources

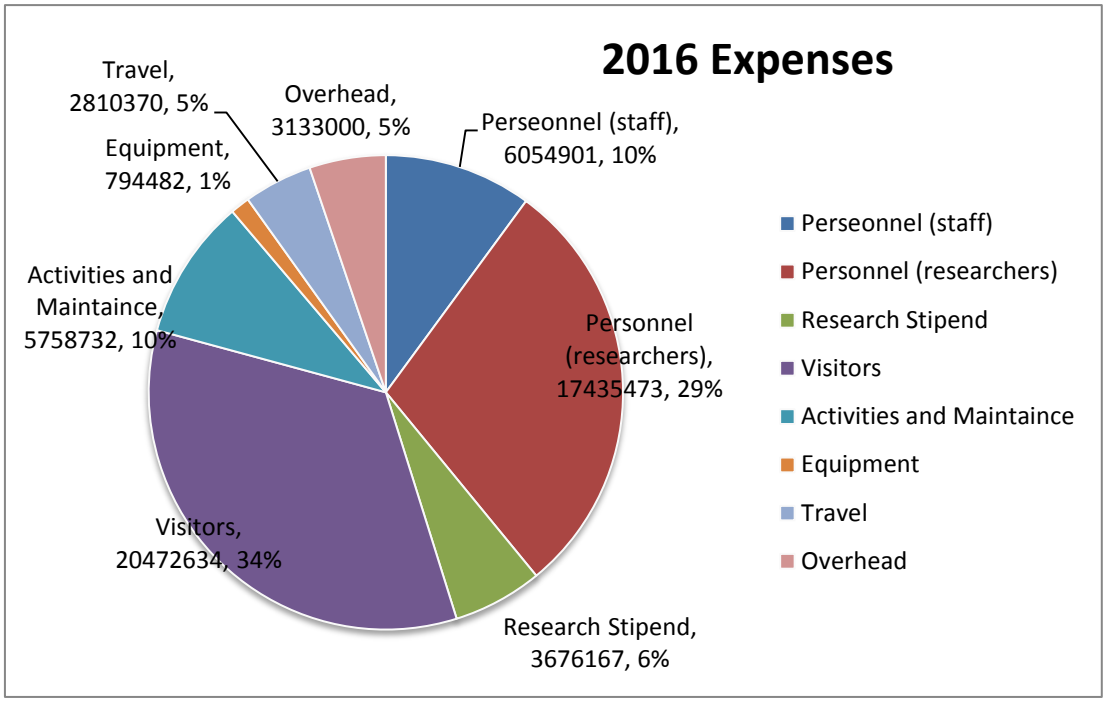


Figure 1-20. 2016 NCTS Expenses

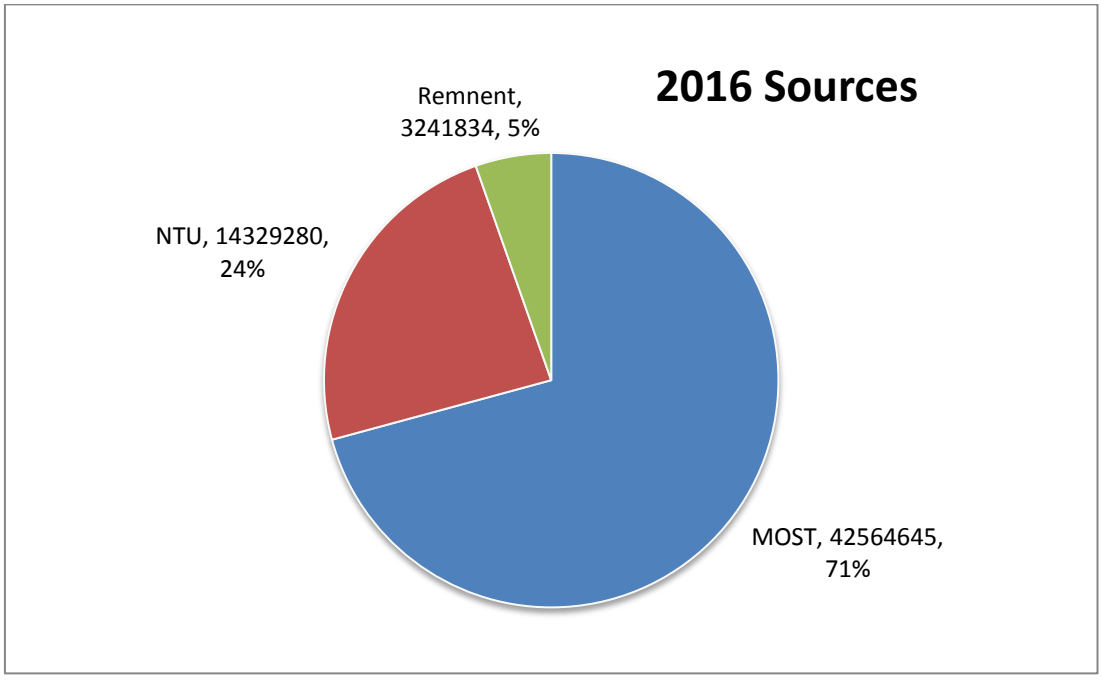


Figure 1-21. 2016 NCTS Budget Sources

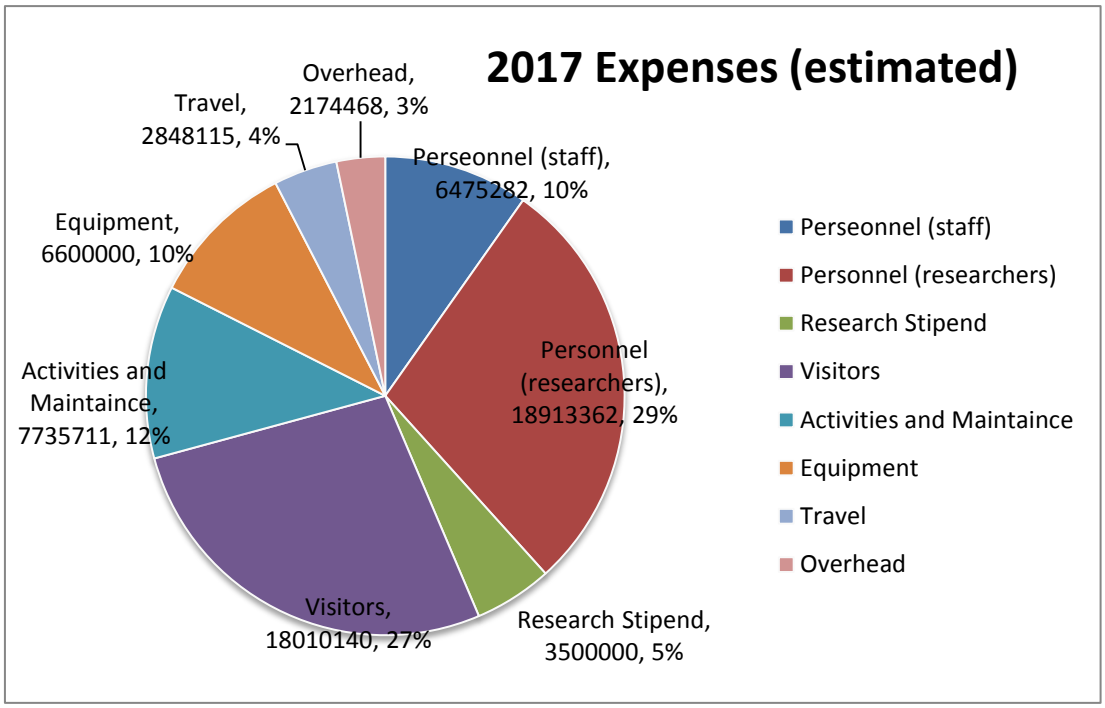


Figure 1-22. 2017 NCTS Expenses

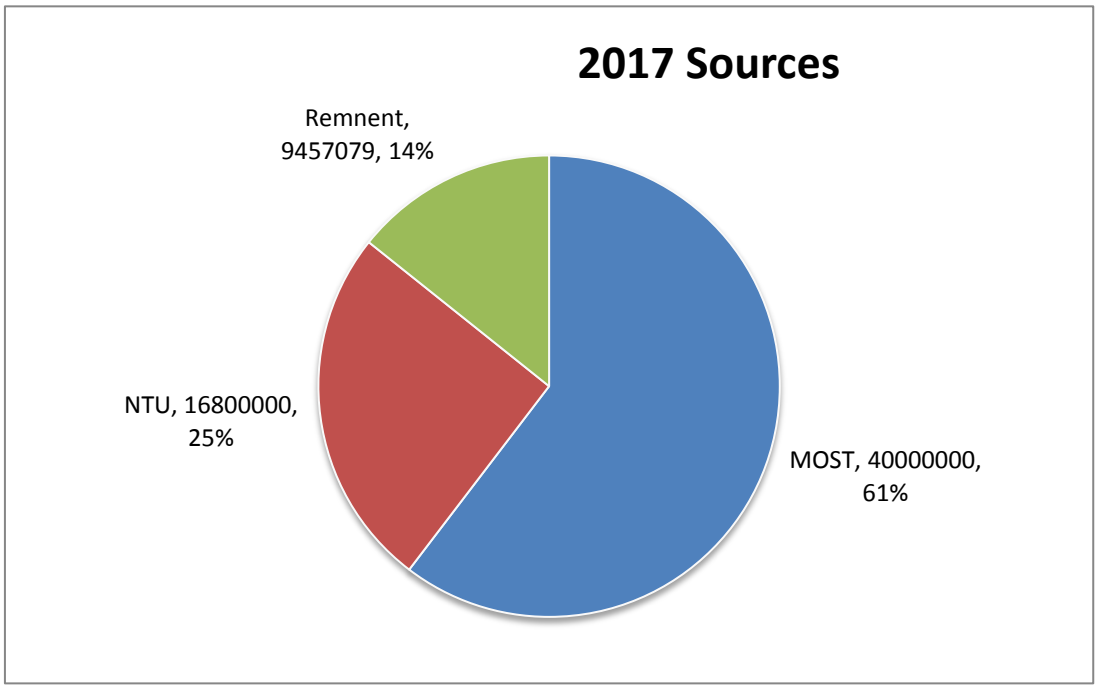


Figure 1-23. 201 NCTS Budget Sources

2 Program A. Number Theory and Representation Theory

2.1 Core members

a. Faculties: Chieh-Yu Chang (NTHU), Ming-Lun Hsieh (AS), Ching Hung Lam (AS), Chia-fu Yu (AS), Yifan Yang (NCTU), Fu-Tsun Wei (NCU), Ming-Hsuan Kang (NCTU), Yung Ning Peng (NCU), Hsian Yang Chen (NUT), Shih Chang Huang (NCKU),

b. Postdocs: Nadim Rustom, Tse-Chung Yang, Jia-Wei Guo, Zhi-Wei Chen, Tomohiro Uchiyama, Mounir Hajli (July 2015-June 2016).

c. Ph.D. students: Yao Cheng, Shi-Yu Chen (NTU), Yi-Hsuan Lin (NCTU, 2016 Ph.D.), Isa Ishikawa (Kyoto U., 2017 Ph.D.).

d. Master students: Nai-Heng Hsu (NTU), Wei-Cheng Huang, Kai-Wen Huang, Po-Fong Chang (NTHU).

2.2 Program Overview

The purpose of the number theory and representation theory program at NCTS is to help Taiwanese number theorists and algebraists create outstanding research in these areas, establish international cooperation and enhance international visibility of number theory in Taiwan. The research topics cover a wide spectrum of algebra and number theory. In the past three years, our members mainly focus on the following six areas:

a. Iwasawa theory and p-adic methods in algebraic number theory and automorphic forms;

b. Multiple Zeta Values in Positive Characteristic;

c. Class numbers and abelian varieties over finite fields;

d. Explicit methods for Shimura curves;

e. Arithmetic of modular forms over function fields;

f. Classification of holomorphic VOAs.

The scientific activities include three part: regular NCTS Number theory and Arithmetic geometry seminars, international workshops and advanced courses for graduate students during summer and spring. The regular seminars are held in Taipei or Hsinchu every Wednesday with local and international speakers, and the organizers are Chia-Fu Yu (Taipei) and Chieh-Yu Chang (Hsinchu). The purpose of international

workshops is to invite young and active researchers in the areas close to our core members and seek for the possible future collaboration. The following is the list of highlights of activities during 2015-2017.

a. Distinguished lecture series:
Illusie Luc gave four lectures on *Nearby Cycles over General Bases and Thom-sebastiani Theorems* in March, 2016.
John Coates gave four lectures on *On the Conjecture of Birch and Swinnerton-Dyer for Quadratic Twists of* $X_0(49)$ in July, 2016.

b. 2016 Summer School of Shimura varieties and Related Topics during May 23-27 and Taipei Workshop of Shimura varieties and Related Topics during May 30-June 3 organized by Chia-fu Yu, Xuehua He and Kai-Wen Lan.

c. PMI-NCTS Joint workshop in Number Theory June 6-8, 2016. The local organizers were YoungJu Choie, Winnie Li and Chia-Fu Yu.

d. Pan-Asia number theory conference in July 11-15, 2016. The organizers were Chieh-Yu Chang, Winnie Li and Yifan Yang.

e. The third Japan-Taiwan Joint conference on number theory at NCTS during September 8-13, 2016. The organizer was Ming-Lun Hsieh.

f. The workshop on p-adic L-functions and algebraic cycles during September 11-15, 2017. The organizer is Ming-Lun Hsieh.

g. Taipei Workshop on Representation Theory of Lie Superalgebras and Related Topics during July 3-7 mainly organized by our young members Chih-Whi Chen, Yung-Ning Peng with the help from Shun-Jen Cheng (AS).

Fostering the young generation of Taiwanese number theorists is also an important task in the program. To this end, our members offered several advanced courses and organized summer schools for students interested in number theory.

a. 2016 NCTS Spring Course: Representation Theory of Finite Groups of Lie type and Abelain Varieties and Related Topics given by Chia-Fu Yu.

b. Yifan Yang gave a series of lectures in NCTS Summer Course on Elliptic Curve during July, 2016.

c. Chieh-Yu Chang and Fu-Tsun Wei organized NCTS Summer Short Course on Number Theory during August, 2016.

d. Winter School on Shimura varieties and related topics, December 10-12, 2016. The lecturer was Chia-Fu Yu.

e. Mini-course on Representation Theory in July, 2017.
Professor Kevin Coulembier from The University of Sydney will give a series of lectures on nvariant Theory for the Periplectic Lie Superalgebra and Ramifications.

f. NCTS Spring Course: Representation Theory of Finite Groups of Lie type and Abelain Varieties and Related Topics given by Chia-Fu Yu

2.3 Research highlights

The highlights of the research accomplishments in the program A consist of the following components: Iwasawa theory, the research on multiple zeta values and arithmetic of modular forms in the function field analogue, topics on abelian varieties over finite fields, explicit methods on Shimura curves and the classification of holomorphic vertex operator algebras.

a. Iwasawa theory:
Iwasawa theory is a systematic p-adic method to study the connection between arithmetic and analytic objects associated to p-adic Galois representations: Selmer groups and L-functions. It was created by Kenichi Iwasawa (1959) in his study on the relationship between ideal class numbers and special values of zeta functions for the cyclotomic $\mathbb{Z}_p$-extension of the rational number field. Later this theory was further explored by Mazur (1972) to study rational points of abelian varieties in towers of number fields and eventually it was generalized by Greenberg (1994) to investigate Selmer groups and L-functions attached to p-adic families of Galois representations. With the development for more than five decades, Iwasawa theory becomes one of the most active areas in modern number theory, and its central problem *Iwasawa main conjectures* has proved to be the most powerful tool to attack various important problems in number theory such as the Bloch-Kato conjecture and the Birch and Swinnerton-Dyer conjecture. The latter is one of seven Millennium prize problems proposed by Clay Mathematical Institute in 2000.

Roughly speaking, Iwasawa main conjectures assert the equality between the size of a p-adic families of Selmer group and its related p-adic L-functions. Coates-Wiles (1977) and Rubin (1992) gave the first proved example of the BSD conjecture in the world by proving Iwasawa main conjecture for imaginary quadratic fields, and works of Kato (2002) and Skinner-Urban (2014) provide otherexamples of BSD conjecture via proving Iwasawa main conjecture for elliptic curves in many cases.

One focus in the number theory program at NCTS is Iwasawa theory, and one of the important results we obtained is a one-sided divisibility towards Iwasawa main conjecture for CM fields as well as p-adic Birch and Swinnerton-Dyer conjecture for CM elliptic curves over totally real fields. People had no idea how to study Iwasawa theory for general CM fields and CM abelian varieties since Rubin proved

the Iwasawa main conjecture for imaginary quadratic fields and CM elliptic curves over the rational number field in 1991. The main difficulty has been that the method of Rubin crucially relies on special units in ray class fields of imaginary quadratic fields whose existence is one of the major open conjectures in algebraic number theory. Our new approach is an extensive study of congruence between Eisenstein series and cusp forms on the quasi-split unitary group $U(2,1)$ of degree three over totally real fields combined with the existence of Galois representations attached to automorphic representations of $U(2,1)$ due to Rogawski et al. This work was published in Journal of the AMS [1] and represents a significant advance in Iwasawa theory for CM fields.

Besides works on the man conjectures for CM fields, we successfully extend the work of Bertiloni-Darmon on the anticylotomic main conjecture for elliptic curves to elliptic modular forms. We construct anticyclotomic p-adic L-functions for modular forms and prove the vanishing of its mu-iinvariants [3]; we prove one-sided divisibility in the anticyclotomic main conjectures for modular forms [2]. Based on recent works of Bertolini, Darmon and Prasanna to construct the Euler system for generalized Heegner cycles, with Francesc Castella we prove the corresponding Perrin-Riou's explicit reciprocity law. Combining with our previous works on the non-vanishing of anticyclotomic p-adic L-functios, we show the non-vanishing of Euler systems for generalizaed Heegner cycles. As applications, under the p-ordinary hypothesis, we obtain several consequences: the rank zero Bloch-Kato conjectures and Selmer parity conjecture for modular forms over imaginary quadratic fields as well as Mazur's conjecture for Selmer groups of modular forms over the anticyclotomic $\mathbb{Z}_p$-extension. This work is published in [CH17] and has been extended by Shinichi Kobayashi who remove the p-ordinary hypothesis.

We continue the project on Yoshida congruence for Siegel modular forms of genus two. This year we work the first two steps. In [HN17a], we prove the non-vanishing modulo p of Yoshida lifts by computing the Bessel peirods of Yoshida and obtain a new proof of the non-vanshing of Yoshida lifts. In [HN17b], we derive an explicit formula of the Petersson norm of Yoshida lifts by elaborating the computation of Rallis inner product formula by Qiu, Gan and Takeda. The next step to construct the p-adic family of Yoshida lifts and create a non-trivial congruence would be a real challenge.

b. Multiple zeta values in positive characteristic:
Multiple zeta functions were first introduced by Euler, and the study on multiple zeta values (MVZ, special values of multiple zeta functions) recently becomes a very hot topic in number theory. A focus in NCTS is the functional analogue of MVZ, and we obtained leading progress along this direction. In [7], we establish a function field analogue of the Goncharov's conjecture for classical multiple

zeta values, abbreviated as MZV. Precisely, we show that the function field MZV form a graded algebra (graded by weights) defined over the base rational function field. In [8], we consider the positive characteristic analog of the question for classical MZV: is there any criterion to determine when a given MZV is Eulerian? This question in the classical setting is only known by Brown, who provides a sufficient condition. In the paper [8], we give an effective criterion for the analogous problem in the function field case. In the classical theory of MZV, Zagier conjectured an explicit dimension formula for space of the double zeta values in terms of the dimension of elliptic cusp forms for the full modular group. Concerning Zagier's conjecture, the best known result due to Gangl, Kaneko and Zagier is that the conjectural dimension provides an upper bound for the space in question, and the dimension is unknown for weight greater than 4. In [9], we establish an effective criterion/algorithm to compute the dimension of the space of double zeta values in positive characteristic and shows that the nave analogue of Zagier's conjecture is not valid in the function field setting. The study of [10] is inspired by the conjectural correspondence between the Eulerian single zeta values at positive integers and the vanishing of the p-adic Kubota-Leopoldt p-adic zeta values at positive integers (note that one direction is well-known). In [10], we consider the Carlitz multiple polylogarithms, abbreviated as CMPLs, that were introduced in [7]. The major result in [10] is to show that the v-adic vanishing of CMPLs at algebraic points is equivalent to its ∞-adic counterpart being Eulerian. This establishes a nontrivial connection between v-adic and ∞-adic worlds.

Recently, with Yoshinori Mishiba, we give a logarithmic interpretation for each positive characteristic MZV. More precisely, we prove that for each MZV, we explicitly construct a uniformizable abelian t-module and a special point for which the MZV in question occurs as certain coordinate of the logarithm of the t-module at that special point we constructed. This result completely generalizes the work of Anderson-Thakur (Annals 1990) on single zeta values to arbitrary MZV. Note that the analogous problem in the characteristic zero setting is still wild open.

c. Class numbers, geometry of Shimura varieties and superspecial abelian varieties over finite fields:
Computation of class numbers explicit has been an important problem in Number Theory. The computation of class numbers of definite central simple algebras A over global fields F is of particular interesting because this also gives the dimension of the space of certain automorphic forms. In [11], we completely solve the problem of computing class numbers for an arbitrary definite central simple algebra over an arbitrary function field.

The Honda-Tate theory gives a beautiful and explicit description for isogeny classes

of abelian varieties over finite fields. The integral theory was then investigated by Waterhouse and other authors. In [12], we continue to complete the explicit description for the isogeny class corresponding to $\sqrt{p}$, the most unaccessible case over the prime field, which complements work of Waterhouse. We also develop all tools for calculating the number of abelian surfaces in this isogeny class-including the generalized Eichler class number formula and the optimal embedding formula.

Together with Jiangwei Xue and Tse-Chung Yang, I am working on superspecial abelian varieties over finite fields. The goal of our projects is to calculate the number of superspecial abelian surfaces over finite fields. This consists of a series of 4 papers: The first one establishes the generalized Eichler class number formula, and calculate the number of the isogeny correspeonding to Weil number $\sqrt{p}$. The second paper classify the quadratic orders over $\mathbb{Z}[\sqrt{p}]$ which occurs in our generalized Eichler class number formula. The third paper calculates the number of superspecial abelian surfaces over finite fields with odd exponents. The fourth paper handles the case where the finite fields with even exponents, which relates to computing conjugacy classes of elements of finite orders in an arithmetic group. For Shimura varieties, I proved the existence of the basic locus of the reduction modulo p of Shimura varieties.

d. Explicit method in Shimura curves:
We report briefly works on explicit methods for Shimura curves. By realizing modular forms on Shimura curves in two way, firstly in terms of solutions of Schwarzian differential equations and secondly in terms of Borcherds forms, we obtain special-value formulas for hypergeometric functions, where the values of certain hypergeometric functions are shown to be explicitly known algebraic multiples of the Chowla-Selberg periods. Then by constructing suitable Borcherds forms and using Schofer's formulas, we completely determine the equations of all hyperelliptic Shimura curves.

Shimura curves are moduli spaces of principally polarized abelian surfaces and can be regarded as a generalisation of classical modular curves. However, because of the lack of cusps on Shimura curves, there are very few explicit methods for Shimura curves. During the year of 2015, our research focused on the method of Borcherds forms, which are certain modular forms on Shimura curves arising from singular theta correspondence. We showed that the problem of constructing Borcherds forms reduces to that of solving certain integer programming problems. By solving these integer programming problems, we can systematically construct Borcherds forms. One immediate application of our method is the determination equations of (hyperelliptic) Shimura curves. This work is published in [13].

Another application is an explicit description of quaternionic loci on Siegel's modular threefold (that is, the moduli point in Siegel's modular threefold whose cor-

responding abelian surface has quaternionic multiplication. We are able to find the modular parameterisation in terms of Hauptmoduls of Shimura curves when the locus is a curve of genus zero. A manuscript on this work is currently under preparation.

e. Arithmetic of modular forms over function fields:
In the work [14], we present a function field analogue of the classical Kronecker limit formula. We first introduce a non-holomorphic Eisenstein series on the Drinfeld half plane, and connect its *second term* with Gekeler's discriminant function. One application is to express the *Taguchi height* of rank 2 Drinfeld modules with complex multiplication in terms of the logarithmic derivative of the corresponding zeta functions. Moreover, from the integral form of the Rankin-Selberg L-function associated to two *Drinfeld-type* newforms, we then derive a formula for a non-central special derivative of the L-function in question. Adapting the classical approach, we also obtain a Kronecker-type solution for Pell's equation over function fields.

In [15], we study the central critical value of Rankin-type L-functions coming from Drinfeld-type automorphic cusp forms convolved with imaginary quadratic characters. Rankin-Selberg method provides us with a very explicit functional equation for these Rankin-type L-functions. When the root number in question is positive, we derive a Gross-type formula over arbitrary global function field. Via the theta series constructed from definite pure quaternions, we then establish a Shimura correspondence between Drinfeld-type forms and metaplectic forms. Having this correspondence at hand leads us to an explicit Waldspurger-type formula in this setting.

f. Classification of VOAs:
The research team lead by C. H. Lam has made important contributions towards the classification of holomorphic vertex operator algebras with central charge 24 in the recent years. In 1993, Schellekens obtained a list of 71 possible weight one Lie algebras for holomorphic VOAs of central charge 24 and gave extensive computational data to back his claims. He also asserted that this result has applications to the heterotic string. In addition, it was conjectured that there are exactly 71 holomorphic VOAs of central charge 24 and the VOA structures are determined by the Lie algebra structures of their weight one subspaces. However, only 39 of the 71 proposed theories had been constructed in that time. In the last 20 years, Schellekens' conjecture has become one of the main conjectures in VOA theory, for at least two good reasons: (a) there are very few good construction techniques for rational VOAs, and Schellekens' problem is an interesting yardstick by which progress in this direction can be measured, and (b) the parallel result for self-dual positive-definite lattices has had an enormous influence on areas such as algebraic combinatorics,

lattice-theory, and various moonshine theories. Therefore, one would expect that knowing the complete list of holomorphic $c = 24$ VOA's will - in the long run - have an even greater impact.

In around 2010, a special class of holomorphic VOAs, called framed VOAs, of central charge 24 were studied by H. Shimakura, H. Yamauchi and C.H. Lam. A complete classification of holomorphic framed VOAs of $c = 24$ has also been achieved by H. Shimakura and C.H. Lam in 2014. In particular, they showed that there exist exactly 56 holomorphic framed VOAs of central charge 24 and they are uniquely determined by the Lie algebra structures of their weight one subspaces under the assumption that they are framed. In addition, a $\mathbb{Z}_3-$orbifold theory associated to lattice VOAs has been developed by Miyamoto in 2013. As an application, a holomorphic VOA whose weight one subspace has the Lie algebra structure $E_{6,3}G_{2,13}$ was constructed. By using the similar methods, two other holomorphic VOAs have been constructed by H. Shimakura and T. Sagaki. Recently, van Ekeren, Moller and Scheithauer announced that they have obtained a mathematically rigorous proof for Schellekens' list using modular invariant of trace functions and the theory of Jacobi forms. They also established the $\mathbb{Z}_n$-orbifold construction for lattice VOAs for general elements of arbitrary orders using an unpublished result of Miyamoto. As an application, they also claimed to have the constructions of several new VOAs in Schellenkens' list. In 2015, H. Shimakura and C.H. Lam developed a new construction method using Li's Delta operator and inner automorphisms. The technique itself was developed by Dong-Li-Mason nearly 20 years ago (using simple currents and inner automorphisms), but these ideas were never applied to substantial construction problems before. Using this technique, Shimakura and Lam are able to construct 6 new examples of holomorphic VOAs of $c = 24$. In this year, Lam and Lin have constructed the last example and completed the construction program for Schellekens' list. Some new techniques associated with modular tensor category has also been developed. The technique using inner automorphisms and the Delta operator also provide some new insights for proving the uniqueness of the VOA structures. Shimakura and Lam are able to prove that the VOA structures of several holomorphic VOAs of $c = 24$ are uniquely determined by the Lie algebra structures of their weight one subspaces. More cases have also been confirmed by Kawasetsu-Lin-Lam. By using the technique ?Reverse orbifold?, we discovered that there may be a direct construction of all 71 cases using a cyclic orbifold construction of ?mixed type? from the Leech lattice VOA. We also noticed that this approach may lead to a uniform proof for the uniqueness of 70 of the 71 cases. Our method unfortunately does not apply to the famous Moonshine VOA.

C.H. Lam continued his work on classification of holomorphic VOAs of central charge 24. Using a $\mathbb{Z}_2$-orbifold construction, he and his collaborators constructed a holomorphic VOA of central charge 24 such that its weight one Lie algebra has the

type $F_{4,6}A_{2,2}$. As a consequence, they verified that all 71 Lie algebras in Schellekens' list can be realized as the weight one Lie algebras of some holomorphic vertex operator algebras of central charge 24.

In addition, they developed a technique which is called "Reverse orbifold construction" and use it to prove the uniqueness of certain holomorphic VOAs of central charge 24. His research team also established the $\mathbb{Z}_p$-orbifold construction of the famous moonshine vertex operator algebra and used it to study certain p-local subgroup of the Monster simple groups.

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3 Prgram B. Algebraic Geometry

3.1 Core Members

a. faculties: Jungkai Chen (NTU), Wu-Yen Chuang (NTU), Chen-Yu Chi (NTU), Ching-Jui Lai (NTU), Jheng-Jie Chen (NCU), Jiun-Cheng Chen (NTHU), Shin-Yao Jow (NTHU), Jia-Ming Liou (NCKU), Jen-Chieh Hsiao (NCKU), Eugene Xia (NCKU), Wan Keng Cheong (NCKU)

b. Postdocs: Zheng-Yu Hu (NCTS), Mario Chan (NCTS), Hiep Dang (NCTS)

c. about 10 graduate students

d. Long-term Visitors: Yujiro Kawamata (Tokyo), Paolo Cascini (Imperial), Caucher Birkar (Cambridge), Masayuki Kawakita (RIMS), Loring Tu (Tufts)

3.2 Program Overview

Algebraic geometry has been one of the core theme of modern mathematics. One the other hand, it is the mathematical theory with possible interaction and applications with many other fields, such as, number theory, differential geometry, mathematical physics, analysis as well. There were almost none working in algebraic geometry 20 years ago. Thanks to the consistent support of NCTS, the research group of algebraic

geometry in Taiwan not only grew up substantially, but also obtained certain international reputation. Through the strategic planing of seminars courses and workshops, for undergraduate, postdocs, and reseachers, the size of the group grows notably in recent years.

Therefore, the main goal of the Topical Program in Algebraic Geometry is to achieve world leading advances and to cultivate the young generation as well.

In fact, Taiwan has strong research group in higher dimensional birational geometry. Almost all renown world experts in the field of birational geoemtry visited NCTS for some period. Not only this, we also attracted world leading experts to visit NCTS for a longer period for research collaboration. This amounts to the following highlights of activities and events in the year 2016.

a. Workshop on Singularities, Linear System and Fano Varieties.
   There is a recent breakthrough in minimal model program done by NCTS Scholar Caucher Birkar. In his series of article, he proved the BAB (Borisov-Alexeev-Borisov) Conjecture together with many boundedness problems around Fano varieties. Actually, most of his

   With the assistance and contribution of Birkar himself, we organized a workshop focus on his recent work. With 19 talks contributed by 12 speakers from all over the world, we went through into details of Birkar's work. We are going to publish a volume on this topic base on the workshop, prefaced by Christohper Hacon.

b. Higher Dimensional Algebraic Geometry.
   This series of workshop was initiated in the year 2004. It was held every 3 years or so. The purpose of this series of workshop is to introduce the most recent development in algebraic geometry and to make Taiwanese algebraic geometers more visible internationally. The workshop 2017 was co-organized by world leading algebraic geometers Yujiro Kawamata. The foreign invited speakers includes:
   Valery Alexeev (Georgia), Paolo Cascini (Imperial College London), Bao-Hua Fu (Chinese Academy of Sciences), Yoshinori Gongyo (Tokyo), Adrian Langer (Warsaw), Yongnam Lee (KAIST), James Mckernan (UCSD), Yusuke Nakamura (Tokyo), Keiji Oguiso (Tokyo), Shinnosuke Okawa (Osaka), Jihun Park (POSTECH), Yuri Prokhorov (Steklov), Karl Schwede (University of Utah), Hiromu Tanaka (Imperial College London), Cehnyang Xu (BICMR), De Qi Zhang (NUS), Zhi Jiang (Fudan).

   Local speakers are: Zheng-yu Hu (NCTS), Jen-Chieh Hsiao (NCKU), Ching-Jui Lai (NTU), Shin-Yao Jow (NTHU).

c. NCTS Seminars in Algebraic Geometry
   We had regular seminar in NCTS in Algebraic Geometry. Due to the increasing popularity of researchers in NCKU, there are regular seminars in Tainan started from last year.

d. NCTS Algebraic Geometry Day
Other than regular seminars, we initiated NCTS Algebraic Geometry Days every month started from 2016. Each time there are 4 talks. The third AG Day was in Mar and the fourth was in May. It serves as a platform for people to share their current project and hence to seek for possible collaboration.

NCTS has become an attracting place for younger researchers in algebraic geoemtry. An evidence is that our recent activities attracts many foreign Ph.D. students and postdocs. They come to participate our activities with their own financial resource. For example, Iacopo Brivio from UCSD (Ph.D. student of McKernan), Stefano Filipazi from Utah (Ph.D. student of Hacon), Haidong Liu from Kyoto (Ph.D. student of Fujino), and Roberto Svaldi from Cambridge (postdoc of Birkar) are the the participants of the Workshop of Singularities, Linear System, and Fano Varieties.

3.3 Research Highlights

The research highlights of the program consists of three parts: first, on explicit birational geometry in dimension three; second, the studies on derived categories on special varieties; and third, on the boundedness problem of varieties of Fano-type.

a. Explicit birational geometry in dimension three

The research team led by Jungkai Chen, together with Jheng-Jie Chen, Shin-Ku Chen, Ching-Jui Lai is one the leading team in the study of geometry of threefolds, especially in the problem related to three dimensional minimal model programs. The previous work of Jungkai Chen provides a decomposition of flips and divisorial contraction to curve into a set of explicit elementary maps, such as blowups and weighted blowups. Let $f : Y \to X$ be a divisorial contraction, or a flip in dimension three. There exists a sequence

$$Y = X_n \to X_{n-1} \to \ldots \to X_1 \to X_0 = X$$

such that each map $X_i \to X_{i-1}$ is one of the following explicit maps: a flop, a blowup along a smooth curve, a divisorial contraction to a point, or a weighted blowup over a point. By using the above decomposition and explicit resolution of singularities, one can similarly obtain and explicit elimination of indeterminancies.

There are several geometric problems solved by such explicit construction. As a consequence, it is proved by Chen and his collaboration Meng Chen of Fudan University that three dimensional version of Noether Inequality holds. This inequality also leads to the foundation of the study of geography of threefolds of general type. By geography, one means the distribution of invariants and relations of invariants.

The worst known example of threefolds of general type is a general hypersurface X_{46} of degree 46 in a weighted projective space $\mathbb{P}(4,5,6,7,23)$. This example with canonical volume $1/420$ is certainly on the boundary of the "map" by geographical consideration. By the above mentioned technique, it is proved that canonical volume $\geq 1/1170$, which is not far from being sharp.

Similar technique could be applicable to the studies of Fano-type threefolds as well. There is an ongoing project of Jheng-Jie Chen and Ching-Jui Lai on bounding c_2 and c_1^3 of weak $\mathbb{Q}$-Fano threefols. It is expected that $c_1^3 \leq 72$ for all weak $\mathbb{Q}$-Fano threefols and this bound is sharp. It is also expected that c_2 is aways pseudo-effective for all weak $\mathbb{Q}$-Fano threefolds.

It is expected that explicit birational geometry of threefolds will be an indispensible part toward the geometry of threefolds.

The goal is to build up complete classification theory parallel to that of surfaces. A better understanding of threefolds explicitly will be helpful to general higher dimensional varieties

b. Derived categories and homological algebraic geometry

Derived category (of bounded complexes of coherent sheaves on algebraic varieties) draws lots of attention in recent years. The milestone was Mukai's invention of Fourier-Mukai transform, which build up an fantastic equivalence between derived categories of abelian and its dual abelian varieties. Since then, more equivalence including K3 surface, elliptic fibrations and flops were discovered. There are several potential development of the theory of derived categories.

First of all, this might lead to some mysterious connection with minimal model program. It is well-known that two minimal models are connected by flops. Therefore, a flop may be considered as a birational map preserving the same level of K, called K-equivalence. It is proved that two varieties with same derived categories, called D-equivalence must be K-equivalence. One might imagine a derived minimal model theory which assert that a minimal model is the model with minimal derived category. Prof. Kawamata, who is also NCTS distinguished scholar, is the leading expert is this aspect and our local group has ongoing joint project with him.

Secondly, the Fourier-Mukai transform has been an effective and powerful tool for understanding moduli spaces between FM-pairs. Especially, it builds a amazing connection between two moduli spaces arising from Fourier-Mukai pairs. This reveals the hidden symmetry for abelian varieties. Later it was extended to K3 surface and Calabi-Yau threefolds. Many more interesting results was discovered thanks to the work of Bridgeland. Not only he found some moduli interpretation of the

Fourier-Mukai transform, but also he built up the theory of stability on the derived categories.

The work of Wu-Yen Chuang was around this circle. His joint work with Jason Lo considered elliptic fibrations with arbitrary base dimensions, extending Lo's previous work on elliptic fibered threefolds. Their joint work gave a criterion under which certain 2-term polynomial semistable complexes are mapped to torsion-free semistable sheaves under a Fourier-Mukai transform. As an application, one can construct an open immersion from a moduli of complexes to a moduli of Gieseker stable sheaves on higher dimensional elliptic fibrations.

In fact, Kollár proved another decomposition theorem for higher direct images in general in 1985. The new results shows that it is possible to characterize each components explicitly by cohomological properties for varieties with maximal Albanese dimension. It is ecpected that the decomposition theorem is related to Hodge theory. The recent work of Popa and Schnell shed some light along this direction. The connection with Hodge ideals and D-module will be further investigated during the Fall semester.

Moreover, the algebraic properties of D-modules over varieties of positive characteristics are a long-term project of Jen-Chieh Hsiao. Extending his previous joint work with K. Schwade, he is able to characterize fixed ideals over F-split toric varieties. Such studies on positive characteristics is one of the mainstreams in recent algebraic geometry and draw certain international attentions.

c. boundedness problem of Fano-type varieties

In the minimal model program, Fano varieties of Picard number one are the building blocks for varieties with negative Kodaira dimension. It it expected that the set of mildly singular Fano varieties of given dimension forms a bounded family. The challenging Borisov-Alexeev-Borisov Conjecture, which asserts boundedness of the set of ϵ-klt log $\mathbb{Q}$-Fano varieties is one of the fundamental conjecture in minimal model theory. It is believed that BAB conjecture is more or less equivalent to the conjecture of termination of flips.

In the previous work of Lai, an effective upper bound of the anticanonical volume for the set of ϵ-klt $\mathbb{Q}$-factorial log $\mathbb{Q}$-Fano threefolds with Picard number one was obtained. He made some progress along this direction by considering threefolds not necessarily of Picard number one. His studies also show that it is possible to obtain an effective Sarkisov Program in dimension three, which factorizes birational maps between Mori fibered spaces into elementary Sarkisov's links.

The recent result of NCTS Scholar Caucher Birkar shows that BAB conjecture holds. Therefore, various bounded problems of Fano-type varieties are therefore solved.

This is considered to be the most important breakthrough in algebraic geometry in recent years. In fact, substantial part of Birkar's work are done in NCTS.

4 Program C. Differential Geometry and Geometric Analysis

4.1 Core Mambers

a. faculties: Mao-Pei Tsui (NTU), Nan-Kuo Ho (NTHU), Chun-Chi Lin (NTNU), Hong-Lin Chiu (NCU) and River Chiang (NCKU). In addition, our group includes several members: Chung-Jun Tsai, Ziming Nikolas Ma, Suh-Cheng Chang, Yng-Ing Lee (NTU), Ting-Jung Kuo (NTNU), Jih-Hsin Cheng (Academia Sinica), Siye Wu, Chiung-Jue Sung, Dong-Ho Tsai (NTHU), Mei-Lin Yau, Rung-Tzung Huang (NCU), Yeh-Kai Wang, Chih-Chung Liu, Kwok-Kun Kwong(NCKU), Chung-Yi Ho (NKNU), Ching-Tung Wu (NPU).

b. postdocs: Kuo-Wei Lee (NTU), Chih-Wei Chen (NCTS), Yang-Kai Lue (NCTS), Ting-Huei Chang (NTHU), Chi-Kwong Fok (NTHU), Ching-Hao Chang (NCU) and Sin-Hua Lai (NCU).

4.2 Overview of the Program

The main goal of the differential geometry and geometric analysis group at NCTS is to create an excellent research environment for Taiwanese differential geometers to work on world class research topics and provide necessary resources to conduct both international research cooperation and research cooperation in Taiwan. Our research group has been very active and maintains a high research standard thanks to the consistent support of NCTS. It is also an important focus to integrate our activities to attract excellent undergraduate and graduate students and also provide new opportunities for the postdoc and junior faculty to broaden their research perspectives. We are hoping that our activities will enhance international visibility of differential geometers in Taiwan. The research topics of this program cover a wide spectrum of in differentia geometry. Our group have focused on the following four areas:

a. Geometric evolution equations and nonlinear partial differential equations in geometry (Y.I. Lee, M. P. Tsui, T. J. Tsai, C. C. Lin,, Y.K. Lue, T. J. Kuo, C. J. Sung, D. H. Tsai, C. C. Liu)

b. Mathematical general relativity (M.P. Tsui, Y.I. Lee, K. W. Lee, Y.K. Wang, K. K. Kwon)

c. Symplectic geometry and Mirror Symmetry (N. K. Ho, R. Chiang, T. J. Tsai, Z. N. Ma, S. Wu, M. L. Yau, C. Y. Ho, C. K. Fok)

d. Geometry of CR manifolds and sub-Riemannian geometry (H. L. Chiu, S. C. Chang, J. H. Cheng, R. T. Huang, C. T. Wu, C. W. Chen, T. W. Chang, C. H. Chang, S. H. Lai)

Many world-known differential geometers have visited NCTS including Mu-Tao Wang (Columbia), Der-Chen Chang (Georgetown), Ernst Kuwert(Freiburg, Germany), Stephan Luckhaus (Leipzig, Germany), Richard Schoen (UC Irvine), Jiaping WWang (Minnesota), Conan Leung, Luen-Fai Tam (CUHK), Martin Guest (Waseda), Chiuu-Lian Terng (UCI), Jaigyoung Choe (KIAS). We have also sponsored students and post-docs to attend international conferences and workshops.

In the next three years year, we are hoping to strengthen these working teams and create more cooperation opportunities between active differential geometers. Our activities and visitors have broaden and strengthen the research topics in our group. In addition, we will also make use of the NCTS platform to create some research oriented courses to train the geometers in Taiwan and even reach out the neighboring Asian counterparts like Japan, Korean and Hongkong. It has been quite difficult for young geometers to find a position in Taiwan. We will also try to crate more connections and opportunities for our young geometers to find a good position to continue their research. It is our hope that our program will inspire and benefit the geometers in Taiwan and lead to a steady growth of the differential geometry and geometric analysis group.

4.3 Research Highlights

The highlights of the program consists of two parts: first, we describe some important breakthroughs in our group and second, the important activities of the last three years.

Our group members have been very productive since the establishment of the NCTS at NTU. We list some of the accomplishments of our group.

a. Mao-Pei Tsui has completed two projects in ”Generalized Lagrangian mean curvature ows in cotangent bundle” and ”Curvature estimates in higher codimensional mean curvature flow” with Mu-Tao Wang and Knut Smoczyk

b. Mao-Pei Tsui and Yng-Ing Lee have finished a paper on the uniqueness of the minimal surface systems and obtained some preliminary results in the existence of Dirichlet problem of the minimal surface systems

c. Chung-Jung Tsai has completed a paper ”Cohomology and Hodge theory on symplectic manifolds” with L.-S. Tseng and S.-T. Yau

d. Nan-Kuo Ho and M. Guest have found surprising relations between the solutions to tt*-Toda equations and classical Lie group theory (as in Kostant, Coxeter, and Steinberg)

e. Chun-Chi Lin, Dall'Acqua and P. Pozzi obtained interesting results about the gradient flow for open elastic curves with fixed length and clamped ends

f. River Chiang, Fan Ding, and Otto Van Koert define symplectic fractional twists, which generalize Dehn twists, and use these in open books to investigate contact structures

g. Ziming Nikolas generalized earlier work on Witten deformation to two interesting cases, namely the Witten deformation of circle valued Morse function and Witten deformation of S^1 equivariant cohomology, and the application of the technique of Witten's deformation to the study of Mirror symmetry

Due to the limited space, we will only describe in detail the works of Chung-Jun Tsai in mean curvature flow and Mao-Pei Tsui in minimal surface systems.

a. The stability of the mean curvature flow in manifolds of special holonomy (Chung-Jun Tsai)

In the 50s, M. Berger classified the possible irreducible holonomies of a Riemannian manifold. There are some special ones in his list:

holonomy	dimension	geometry
SU(n)	$2n$	Calabi–Yau
Sp(n)	$4n$	hyper-Kähler
G2	7	G2
Spin(7)	8	Spin(7)

Theses geometry can be characterized by the existence of certain parallel forms. The existence of these parallel forms implies that the metric is Ricci-flat. On the other hand, these parallel forms are all *calibration* forms as introduced by R. Harvey and B. Lawson. From a calibration form, they define the notion of a *calibrated submanifold*. These submanifolds are not just minimal submanifolds, they actually minimize the volume functional in their homology classes.

Of particular interests are special Lagrangians in Calabi–Yau, associatives and coassociatives in G2, and Cayley submanifolds in Spin(7). These geometric objects attracted a lot of attentions in recent years. On the one hand, they are natural generalizations of algebraic subvarieties in algebraic manifolds and thus are of immense geometric interest. On the other hand, they appear in various proposals of string

theory such as Mirror Symmetry and the M-theory. However, our understanding of these geometric objects is still rather limited.

Since calibrated submanifolds are minimal, it is a natural attempt to construct calibrated submanifold by the mean curvature flow. Recently, Mu-Tao Wang and Chung-Jun Tsai ([1]) study the mean curvature flow in the most well-known examples of manifolds with special holonomy. They are the Stenzel metric on the cotangent bundles of spheres, the Calabi metric on the cotangent bundles of complex projective spaces, and the Bryant-Salamon construction of G2 and Spin(7) metrics. These examples are all total space of a vector bundle, and the zero section is a calibrated submanifold. They are believed to serve as the leading order approximation for the neighborhood of a calibrated submanifold. By the work of R. McLean, the zero section is stable in the sense of the second variational formula.

In a joint paper with Mu-Tao Wang, Chung-Jun Tsai proves that the zero section is the unique *compact*, minimal submanifold. In contrast to the result of R. McLean, their result is a *global rigidity* result. Moreover, they use the estimates in the global rigidity to prove the dynamical stability of the zero section. Namely, any submanifold which is C^1-close to the zero section must converge to the zero section under the mean curvature flow. This dynamical stability theorem appears to be the first such result for manifolds of special holonomy.

b. The uniqueness of the minimal surface systems

Minimal surface system was studied by Lawson and Osserman [2]. Unlike in the codimension one case, higher codimension Dirichlet problem for minimal surface system does not necessary have existence, uniqueness, stability and regularity result as pointed out in [2]. In particular, Lawson and Osserman constructed counter example for both stability and uniqueness for the case $n = m = 2$.

Higher codimension stability and uniqueness problems for minimal surface system were studied in [3, 4] by Lee and Wang in a general Riemannian setting. In [4], Lee and Wang derived the second variational formula for area functional in terms of singular values of the graph function. They found several criteria for the stability of the minimal surface system in terms of singular values. Specifically, they proved that distance decreasing condition or a condition on the 2-Jacobian will imply the stability of minimal graph. Their results also included the classical result that every codimension one minimal graph is stable. Moreover, they were able to obtain uniqueness result for the class of distance decreasing map.

Along the same approach, Lee-Tsui [5] further investigated the stability problem by

studying convexity of the area functional $\mathcal{A}$, where

$$\mathcal{A}(x_1, ..., x_n) = \sqrt{\prod_{i=1}^{n}(1 + x_i^2)} \quad \text{on} \quad \mathbb{R}^n_{\geq 0} := \{(x_1, \cdots, x_n) : x_i \geq 0\} \tag{1}$$

The uniqueness problem is not addressed in Lee-Tsui's paper. In a joint work with Yng-Ing Lee and Yuan Shyong Ooi, Mao-Pei Tsui obtained the following uniqueness of minimal surface system in higher codimension. Denote $\mathcal{M}$ to be the subset in $\mathbb{R}^n_{\geq 0}$ satisfying the following two conditions

$$x_i x_j < 1 \qquad \text{for } 1 \leq i \neq j \leq n \tag{2}$$

and

$$\prod_{i=1}^{n}(1 - x_i^2) + \sum_{i=1}^{n}(1 - x_1^2) \cdots (1 - x_{i-1}^2) x_i^2 (1 - x_{i+1}^2) \cdots (1 - x_n^2) > 0 \tag{3}$$

The *strict convexity* of the functional $\mathcal{A}$ is equivalent to that the singular values lie in the set $\mathcal{M}$. They prove that

Theorem 1. *Assume* $f_0 : \Omega \subset \mathbb{R}^n \to \mathbb{R}^m$ and $f_1 : \Omega \subset \mathbb{R}^n \to \mathbb{R}^m$ satisfy the minimal surface system with the same boundary data. If both the singular values vectors of f_0 and f_1 lie in a symmetric convex subset of $\mathcal{M}$, then $f_0 = f_1$.

Next we describe some of the most important activities of the last three year.

a. Weekly differential geometry seminar at NTU, Sinica - NCTS Geometry Seminar at Academia Sinica, NCTS and NTHU Joint Geometry and Topology Seminar at NTHU

b. Five Taiwan Geometry Symposium (May 2, 2015 at NCKU, Oct 24-25, 2015 at NDHU, May 14, 2016 at NTHU, October 29, 2016 at NCKU, April 15, 2017 at NTU)

   This series of Symposium was started in the year 2010 . Each time, we invited some young geometers or world leading experts to talk about the most recent advances in differential geometry.

c. Workshop for young geometers (December 13th, 2015)

d. 2016 The third Taiwan International Conference on Geometry (2016-01-18–2016-01-22)

   The main topics of the third Taiwan International Conference on Geometry are on conformal geometry, CR structures, and minimal submanifolds. This is a successful joint conference with Institute of Math, Academia Sinica. The speakers of this conference include some of the most active researchers in differential geometry.

e. NCTS Summer Course on Aspects of Geometric Analysis (July 3-12, 2016 at NTU)

A summer course "Aspects of Geometric Analysis" organized by Mao-Pei Tsui and Mu-Tao Wang took place from July 4th to July 12th, 2016. The course was intended for advanced undergraduate students or beginning graduate students who are interested in the field of Geometric Analysis. The emphasis is on geometric partial differential equations on Riemannian manifolds with elementary four topic lectures: Riemannian manifolds and submanifolds geometry (Mu-Tao Wang), isometric embeddings of surfaces (Ye-Kai Wang), Ricci flows on surfaces (Mao-Pei Tsui), and the Poincaré uniformization theorem (Chung-Jun Tsai). They are followed by an advanced topic lecture "The geometry of the Schwarzschild spacetime" by Mu-Tao Wang. Many undergraduate students have attended this summer course.

f. Summer Course on Fractional Sobolev Spaces in Geometric Knot Theory (August 2-5, 2016 at NTU)

Fractional Sobolev spaces and fractional partial differential equations appear in many areas of current mathematics. In this series of lectures, Simon Blatt (University of Salzburg) give an introduction to the topic and recent applications in geometric knot theory. He started this series of talks with an introduction to geometric knot theory and fractional Sobolev spaces and operators. Then he discussed in two lectures the regularity of critical points of knot energies and their negative gradient flows.

g. 2016 NCTS Workshop on Geometric Analysis December 30, 2016 - January 1, 2017

Professor R. Schoen visited NTU and NCTS. During his visit, he helped us organize this workshop. We invite many active geometric analysts and we hope to foster discussions and interactions within the geometry community in Taiwan and Asia. The list of speakers include Jui-En Chang (NTU Chi-Wei Chen (NCTS), Jaigyoung Choe (KIAS), Frederick Fong (The Hong Kong University of Science and Technology), Yen-Chang Huang (Xiamen University at Malaysia), Ting-Jung Kuo (NTU), Kwok-Kun Kwong (NCKU), Hojoo Lee (KIAS), Conan Nai Chung Leung (The Chinese University of Hong Kong), John Man Shun Ma (UBC), Chung-Jun Tsai (NTU) and Sumio Yamada (Gakushuin University).

h. 2017 NCTS Mini-Workshop on Geometric Analysis (January 5, 2017)

We organized this this mini-workshop to let the young geometric analyst in Taiwan have an opportunity to present their research to Professor R. Schoen and let Professor R. Schoen give them some feedback about their research.

i. 2017 NCTS Mini-Course and Workshop on Ricci Flow and Related Aspects (May 31-June 16, 2017)

This Mini-Course and Workshop touch on various aspects of geometric evolution equations with emphasis on Ricci flow and mean curvature flow. The event aims to bring together experts to discuss current development and future directions. The list of speakers include Jacob Bernstein (JHU), Bing-Long Chen (Sun Yat-sen Univ.), Chih-Wei Chen (NTU), Brett Kotschwar (Arizona State), Peng Lu (Oregon), Ovidiu Munteanu (UConn.), Lei Ni (UCSD), Xiaochun Rong (Rugters), Miles Simon (Magdeburg), Luen-Fai Tam (CUHK), Chung-Jun Tsai (NTU), Bing Wang (Wisconsin-Madison), Ben Weinkove (Northwestern), Detang Zhou (UFF).

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5 Program D. Differential Equations and Stochastic Analysis

5.1 Core Members

a. Organizers: Jenn-Nan Wang (NTU), Yuan-Chung Cheu (NCTU), Jung-Chao Ban (NDHU), Chao-Nien Chen (NTHU),

b. Faculties: Chiun-Chuan Chen(NTU), Jann-Long Chern (NCU), Kuo-Chang Chen (NTHU), Kung-Chien Wu (NCKU), Hung-Wen Kuo (NCKU), Jin-Cheng Jiang (NTHU), Lung-Chi Chen (NCCU), Shuenn-Jyi Sheu (NCU), chang-Hung Wu (Tainan U.), Chin-Lung Lin (NCKU), Ru-Lin Kuan (NCKU), Zhi-You Chen (NCUE), Shin-Yuan Huang (NSYSU), Chun-Hsiung Haia (NTU), Feng-Bin Wang (Chang Gung U.)

c. Postdocs: Catelin Castea (NCTS), Li-Ren Lin (NCKU), Manas Kar (NCTS), Chien-Hao Huang (NCTS), Cheng-Fan Su (NCU)

d. Students: 10 Ph.D/ 20 Master

5.2 Program Overview

Thanks to the support of NCTS, we have seen a booming development in the program of Differential Equations and Stochastic Analysis in recent years. This program is the most diverse program in the NCTS. Differential equations and stochastic analysis are developed independently. The main aim of this program is to bridge the gap between these two topics. On the other hand, mathematical biology and dynamical systems are the most important applied fields of differential equations. The techniques of differential equations may provide essential tools in stochastic analysis and mathematical biology; while problems arising from stochastic analysis, mathematical biology, and dynamical systems motive the development of differential equations. Besides of the interdisciplinary studies, we also put our efforts on improving research achievements in each field. Our another goal is to connect other outstanding scholars in the world. Every year, we invited lots of active researchers from all over the world to visit NCTS and interact with our members and students. We also organized many conferences and workshops with speakers from other countries. The program has evolved into a very solid research group in NCTS.

a. Partial Differential Equations
   In the subprogram on PDEs, we are mainly concerned with the kinetic theory, fluid equations, nonlinear Schrödinger equations, inverse problems, etc. We have made progress on the Liouville equation with exponential nonlinearity, the Landau equation, the Landis conjecture, quantitative uniqueness estimates, the Carleman estimates for equations with discontinuous coefficients and applications. In the past few years, we have devoted to the study the properties of large-scale atmospheric fluids. Among the most popular models in this research fields, we pay our attention to the Navier-Stokes equation and the primitive equation. We are particular interested in the time periodic characteristic. We studied the mechanism of the time periodic flows or the systems driven by periodic forcing. We also organized many workshops and symposia for young scholars in which all of speakers are either postdocs or PhD students.

b. Dynamical System
   Dynamical System is one of the major and classical research areas in mathematics and mathematical science. Various activities supported by NCTS are organized to widen the spectrum of research groups on dynamical systems in Taiwan. The aim of these programs is to promote international collaborations and to provide training for young scholars and students. This subprogram has a lot of activities in 2015-2017. For example, 2015 Workshop on Dynamical Systems, 2015, 2016, 2017

Young Dynamics Day, 2016 Workshop on Dynamical Systems & 2016 China, Hong Kong, Taiwan Joint Conference on Dynamical Systems, 2017 Workshop on Dynamical Systems, etc.

c. Mathematical Biology
The field of mathematical biology is closely related to PDE. There are many interesting problems arising in studying new phenomena observed in biology and ecology. Neuroscience is one of the fastest growing fields in biology in this century. As enormous amount of neural imaging data have been produced in the past decade, informatics tools and data-sharing platforms that provide efficient analysis, modeling and management of these data are urgently needed. With an aim to facilitate interactions between researchers in mathematics and related fields, we organize a workshop in respond to the demand. Through the stimulation of novel ideas from international renowned researchers, local experts across disciplines to share their latest studies. In the mathematical biology subprogram, we have obtained interesting results for the reaction-diffusion equations that improve many existing results. Moreover, we studied the wave phenomena on the sphere and found that the stationary waves for the bistable kinetics on the sphere play a key role in the study of waves on the sphere. We also investigated new phenomena of the 3-species competing system not observed in the 2-species system. Several activities including workshops, tutorials, and special lectures were organized in 2015-2017.

d. Probability and Stochastic Analysis
The group of probability and stochastic analysis in Taiwan is small, but people in this group are very close and work very hard in recruiting young scholars and students. Our research topics include: Markov chains and mixing, mathematical problems from finance, stochastic heat equations, phase transitions and critical behavior for some statistical mechanics models, disorder chaos in the spherical mean-field model, branching process, self-interacting random walk and some other applied probability models. In addition, There are regular probability seminars at National Central University, National Chiao Tung University, National Chengchi University and Academia Sinica. We also organize workshops and summer short courses every year.

5.3 Research Highlights

We obtained many important results in 2015-2017. In the following, we list some selective achievements.

a. Partial differential equations

(1) In Chiun-Chuan Chen and Chang-Shou Lin's work, they studies the Liouville equation with singular sources and derived the topological degree formula for

noncritical values of the total mass. They also give several applications of this formula, including existence of the curvature?$+1$ metric with conic singularities, doubly periodic solutions of electroweak theory, and a special case of self-gravitating strings.

(2) (Kung-Chien Wu) We study the well-posedness of the spatially homogeneous Landau equation with soft potentials, i.e. the long-range interactions with parameters in a range [-2,0). The global well-posedness is important; this is because Villani has been proved a linear functional inequality between the entropy and the entropy production by constructive methods, from which one deduces an exponential convergence of the solution to the spatially homogeneous Landau equation towards the Maxwellian equilibrium in relative entropy. In the literatures, the well-posedness was solved by Desvillettes-Villani for hard potentials [0,1), Villani for Maxwellian molecules, and Gualdian-Fournier for soft potentials (-2,0). However, I extend the range to [-2,0) by using entropy-entropy production estimate and bootstrap procedure. Up to now, the range in [-3,-2) still open. In another work, we deals with the inhomogeneous Landau equation on the torus in the cases of hard, Maxwellian and moderately soft potentials. We first investigate the linearized equation and we prove exponential decay estimates for the associated semigroup, here the semigroup estimate generalize both the weight and spaces. We then turn to the nonlinear equation and we use the linearized semigroup decay in order to construct solutions in a close-to-equilibrium setting. Finally, we prove an exponential stability for such a solution, with a rate as close as we want to the optimal rate given by the semigroup decay. Compare the previous results, this result largely generalize the solution class of the Landau equation near equilibrium.

(3) Jenn-Nan Wang, collaborated with Carlos Kenig and Luis Silvestre, has made a big breakthrough on the Landis conjecture in this paper. In the late 60's, E.M. Landis conjectured that if $\Delta u + Vu = 0$ in $\mathbb{R}^n$ with the infinity norm of V being bounded by 1 and the solution u being bounded. Assume that the solution u satisfies $|u(x)| \leq C\exp(-C|x|^{1+})$, then $u = 0$. Landis' conjecture was disproved by Meshkov who constructed such V and nontrivial u satisfying $|u(x)| \leq C\exp(-C|x|^{4/3})$. He also showed that if $|u(x)| \leq C\exp(-C|x|^{-4/3+})$, then $u = 0$. A quantitative form of Meshkov's result was derived by Bourgain and Kenig in their resolution of Anderson localization for the Bernoulli model in higher dimensions. It should be noted that both V and u constructed by Meshkov are complex-valued functions. It remains an open question whether Landis' conjecture is true for real-valued V and u. In this work, we confirmed Landis' conjecture for any real solution u of the equation $\Delta u - \nabla(Wu) - Vu = 0$ in $\mathbb{R}^2$, where $W(x,y) = (W_1(x,y), W_2(x,y))$ and $V(x,y)$ are measurable, real-valued, and $V(x,y)$ is nonnegative.

b. Dynamical systems

(1) Higher dimensional symbolic dynamical systems and tree-shifts of finite type (J.-C. Ban and S.-S. Lin): Shift space is a powerful tool to describe the solution structures in physical systems and lattice dynamical systems. While the dynamical behavior of one-dimensional shifts of finite type is explicitly characterized, the properties of multidimensional ones are barely known. J.-C. Ban, W.-G. Hu and S.-S. Lin provided power methods and theory to characterize the mixing properties of higher-dimensional SFTs. J.-C. Ban and C.-H Chang provided the analogous results on TSFTs. The entropy theory on TSFTs is also established by J.-C. Ban and C.-H. Chang recently. Based on our knowledge, these results are new and useful.

(2) Variational method on n-body problems (K.-C. Chen): K.-C. Chen and his collaborators considered the challenging problem to determine possible shapes of central configurations which are of special importance in celestial mechanics. They proved the existence of convex but not strictly convex central configurations for the planar five-body and spatial seven-body problems. More recently, they characterized strictly convex planar five-body central configurations in terms of mutual distances

(3) Entire solutions for delayed monostable epidemic models (C.-H. Hsu): S.-L. Wu and C.-H. Hsu studied the existence of entire solutions for delayed monostable epidemic models with and without the quasi-monotone condition. They established the comparison principle and construct appropriate sub-solutions and upper estimates in the quasi-monotone case. Some new types of entire solutions are constructed by using the traveling wave fronts and spatially independent solutions of two auxiliary quasi-monotone systems and a comparison theorem for the Cauchy problems of the three systems in the non-quasi-monotone case.

c. Mathematical biology

(1) Je-Chiang Tsai and his collaborators study the reaction-diffusion systems on the sphere. It turns out there are very few works for reaction-diffusion systems on the sphere. However, recent investigation of immune systems suggests that it is necessary to study the wave phenomena on the sphere. On the other hand, due to the boundedness of the sphere, the notion of traveling waves must be adapted. They have found that the stationary waves for the bistable kinetics on the sphere play a key role in the study of waves on the sphere. Indeed, they have used the stationary waves to construct suitable sub/super-solutions to explain the propagating phenomena on the sphere. The difficulty of analysis arises from the lack of the explicit form of the Green function for the Laplace-Beltrami operator.

(2) Chao-Nien Chen, Chiun-Chuan Chen and Chih-Chiang Huang in their paper "Traveling waves for the FitzHughNagumo system on an infinite channel", study the traveling wave solutions of the FitzHughNagumo system on an infinite channel. Based on a variational formulation in which a non-local term depends on a parameter, the speed of a traveling wave can be selected out. Furthermore, to show the existence of a traveling wave solution with such a speed, we seek a minimizer subject to a constraint.

Interesting activities in this subprogram include (i) 2015 NCTS Workshop on Partial Differential Equations and Applied Mathematics organized by Chiun-Chuan Chen and Chao-Nien Chen featured invited speakers Sze-Bi Hsu (National Tsing Hua University), Shin-Ichiro Ei (Hokkaido University), Li-Chang Hung (National Taiwan University), Zhi-You Chen (National Changhua University of Education), Feng-Bin Wang (Chang Gung University), Shigeru Sakaguchi (Tohoku University); (ii) 2015 NCTS Special lecture on dynamical systems given by Petrus van Heijster (Queensland University of Technology); (iii) 2016 NCTS Special lecture on Analysis delivered by Nicola Fusco (University of Napoli, Italy).

d. Stochastic analysis

(1) The research of Markov chains and mixing is based by Guan-Yu Chen. The research highlight is as follows. (a) (Cutoffs of birth and death chains.) In 2006, Diaconis and Saloff-Coste determined the cutoff in separation using the eigenvalues of transition matrices and, later in 2010, Ding, Lubetzky and Peres determined the cutoff in the total variation using the mixing time and the spectral gap. In the year of 2014-2015, Chen and Saloff-Coste provide a probabilistic criterion on the existence of cutoffs and characterize the cutoff time and window using the expectation and variance of the first hitting time to large set. Those results are collected and published in the following article: Guan-Yu Chen and Laurent Saloff-Coste, Computing cutoff times for birth and death chains. Electronic Journal of Probability, 20 (2015), no. 76, 1-47. (b) (Cutoffs of product chains.) This project is aroused by Chen and Kumagai in early 2015 and, recently, they obtained a fundamental inequality on the comparison of the total variation distance and the Hellinger distance, which says that both distances will be close to 0 or 1 simultaneously. This result identifies cutoffs in the total variation with cutoffs in the Hellinger distance, while the Hellinger distance of product chains can be easily represented by the Hellinger distance of the original chains. From the perspective of probability theory, this may lead to a new branch on the study of cutoffs in the total variation. Those results are collected and published in the following article: Guan-Yu Chen and Takashi Kumagai, Cutoffs for product chains (2017) arXiv:1701.06665. Guan-Yu Chen and Takashi

Kumagai, Products of random walks on finite groups with moderate growth (2017), to appear in Tohoku Mathematical Journal.

(2) The research of phase transitions and critical behavior for some statistical mechanics models is based on Lung-Chi Chen and his coauthors (Akira Sakai and Shu-Chiuan Chang). In the project with Akira Sakai, we would like to proof the mean field behavior for long-range self-avoiding walk, percolation and Ising model when the dimensions are larger than their upper critical dimensions (depending on the models). We have showed this problem. However we guess the mean field behavior may be hold when the dimensions equal to their upper critical dimensions (depending on the models). It will be very important and impressive results if we can show it. However it is very tough problem and we need more time to do it. In the project with Shu-Chiuan Chang, we focus on special oriented percolation model and we want to obtain the critical behavior and rate of convergence of this model. During this three years, we have completed the project of "Asymptotic behavior for a version of directed percolation on the honeycomb lattice" and the manuscript has been published at Physica A 2015, 436, 547-557. Moreover Lung-Chi , Shu-Chiuan Chang and Chien-Hao Huang (a post-doctor at NCTS) have completed the project of "Asymptotic behavior for a generalized Domany Kinzel model" and the manuscript has been published at J. Stat. Mech, 2017, 023212.

(3) In the years from 2015 to 2017, there are many short courses of probability in NTU campus:
(1) 2015 NCTS Mini course on Random Matrices, June 29-July 13,
speaker: Horng-Tzer Yau (Harvard). (2) 2015 NCTS Short course on Random Walks, July 14-28, speaker: Lung-Chi Chen (NCCU).
(3) 2016 NCTS Seminar in Quantum Random Walks, March 11-21, speaker: Wei-Shih Yang (Temple University).
(4) 2016 NCTS Probability Summer Courses: Topic I: Introduction to Stochastic Calculus and Applications speakers: Tzuu-Shuh Chiang (AS), Shuenn-Jyi Sheu (NCU); Topic II: Markov chains and Mixing times, speaker: Guan-Yu Chen (NCTU).

6 Program E. Scientific Computing

6.1 Core Members

a. Faculties: Weichung Wang (NTU), I-Liang Chern (NTU), Tsung-Min Huang (NTNU), Ming-Chih Lai (NCTS) Shuh-Yuh Yang (NCU).

b. Postdoc: Zhenchen Guo (ST Yau Center), Wei-Shou Su (ST Yau Center), Xin Liang

(NCTU).

c. Students: 3 Ph.D. / 7 Master

d. Long-term Visitors: Zhenyue Zhang (Zhejian Univ.), Tiexiang Li (South-East Univ.)

6.2 Overview of the Program

Due to the enormous progress in computer technology and numerical software that have been achieved in recent years, the use of numerical simulations in exploring new sciences and engineering gains more and more importance. Scientific computation in many cases offers a cost effective technique, such as numerical linear algebra, computational fluid dynamics and computational electromagnetism, to investigate the real-life sciences which has been regarded equally ubiquitous along with the experiment and theory. A challenging topic in scientific computing is how to design efficient algorithms for numerical PDE, numerical linear algebra, computational electromagnetism, computational fluid dynamics, fluid-structure interaction problems etc., on modern computer systems (CPU/GPU parallelization).

Based on the existing research man power in Taiwan and the current frontier research directions internationally, in this year, our focus is on, but on restricted to, the following topics:

a. Numerical PDEs for solving 3D inextensible vesicle in Navier-Stokes flows, and the electrodeformation and electrohydrodynamics of a vesicle in Navier-Stokes leaky dielectric fluids under a DC electric field;

b. Numerical PDEs for solving singularly perturbed problems, Maxwell's equations with non-H^1 solution, and fluid-structure interaction problems;

c. Matrix computations in three dimensional (3D) dispersive metallic photonic crystals, 3D Maxwell's transmission eigenvalue problems, computing the smallest eigenpair of a large irreducible M-matrix

d. High-performance computing in linear system solver for 3D FDFD photonic device analysis, solving the information-criterion-based optimization problems and rank-revealing.

e. Bayesian uncertainty quantification in sparse representation surrogate modeling, the singular value decomposition of large-scale matrices, experimental designs in computer experiments and optimal designs for mixture models in data science

In the years of 2015-2016, we attracted world leading experts to visit NCTS for a longer period, for example, Rio Yokota and Edmond Chow give a short course for

fast multipole methods (FMM) and high-performance numerical solvers with applications from 2016, March 21 to March 25 and May 3 to May 19, respectively. Not only this, we also invited Daniel B. Szyld who is the Editor-in-Chief of SIAM Journal on Matrix Analysis and Applications to visit NCTS and gave a talk in Workshop on Recent Development of Matrix Computations. In order to provide the opportunity of academic discussion for the scientific computing researchers, we also organized 2016 NCTS Workshop on Computational Mathematics for Young Researchers at March 18-19. In the year 2017, we organize Student Workshop on Data Science (2017/1/12), Introduction to Parallel Programming for Multicore/Manycore Clusters (2017/2/21-24) and Conference on Advanced Topics and Auto Tuning in High-Performance Scientific Computing (2017/3/10-11).

6.3 Research Highlights

In recent years, the scientific computing groups in NCTS have yielded significant advances in the topics of numerical PDEs for Navier-Stokes equations, matrix computations for three-dimensional (3D) Maxwell equations, high performance computing and data science. The most significant contributions include the following:

a. Numerical method for 3D vesicle simulations.
   The research team led by Ming-Chih Lai extends their previous immersed boundary (IB) method for 3D axisymmetric inextensible vesicle in Navier-Stokes flows to general three dimensions. Despite a similar spirit in numerical algorithms to the axisymmetric case, the fully 3D numerical implementation is much more complicated and is far from straightforward. A vesicle membrane surface is known to be incompressible and exhibits bending resistance. As in 3D axisymmetric case, instead of keeping the vesicle locally incompressible, they adopt a modified elastic tension energy to make the vesicle surface patch nearly incompressible so that solving the unknown tension (Lagrange multiplier for the incompressible constraint) can be avoided. Nevertheless, the new elastic force derived from the modified tension energy has exactly the same mathematical form as the original one except the different definitions of tension. The vesicle surface is discretized on a triangular mesh where the elastic tension and bending force are calculated on each vertex (Lagrangian marker in the IB method) of the triangulation. A series of numerical tests on the present scheme are conducted to illustrate the robustness and applicability of the method. They perform the convergence study for the immersed boundary forces and the fluid velocity field. They then study the vesicle dynamics in various flows such as quiescent, simple shear, and gravitational flows. Their numerical results show good agreements with those obtained in previous theoretical, experimental and numerical studies.

b. Coupling IB and IIM to study the vesicle electrohydrodynamics.
The research team led by Ming-Chih Lai develops a coupled immersed boundary (IB) and immersed interface method (IIM) to simulate the electrodeformation and electrohydrodynamics of a vesicle in Navier-Stokes leaky dielectric fluids under a DC electric field. The vesicle membrane is modeled as an inextensible elastic interface with an electric capacitance and an electric conductance. Within the leaky dielectric framework and the piecewise constant electric properties in each fluid, the electric stress can be treated as an interfacial force so that both the membrane electric and mechanical forces can be formulated in a unified immersed boundary method. The electric potential and transmembrane potential are solved simultaneously via an efficient immersed interface method. The fluid variables in Navier-Stokes equations are solved using a projection method on a staggered MAC grid while the electric potential is solved at the cell center. A series of numerical tests have been carefully conducted to illustrate the accuracy and applicability of the present method to simulate vesicle electrohydrodynamics. In particular, we investigate the prolate-oblate-prolate (POP) transition and the effect of electric field and shear flow on vesicle electrohydrodynamics. Their numerical results are in good agreement with those obtained in previous work using different numerical algorithms.

c. 3D dispersive metallic photonic crystals.
The electromagnetic wave propagation through dispersive metallic photonic crystals has been extensively studied over the past few decades. A standard model to study the electromagnetic effects in periodic structures and dispersive isotropic materials is the 3D Maxwell equation. In the numerical simulation of 3D dispersive metallic photonic crystals, one important task is to compute the corresponding band structures. In the computing band structure, the discretized Maxwell equations result in large-scale nonlinear eigenvalue problems, which are very challenging due to a high dimensional subspace associated with the eigenvalue zero and the fact that the desired eigenvalues (with smallest real part) cluster and close to the zero eigenvalues. For the special lossless Drude model, the nonlinear eigenvalue problem can be reformulated as a standard eigenvalue problem. To tackle these computational difficulties in solving standard and nonlinear eigenvalue problems, the research team led by Wen-Wei Lin, together with Tsung-Ming Huang and Weichung Wang proposes a hybrid Jacobi-Davidson method (hHybrid) that integrates harmonic Rayleigh-Ritz extraction, a new and hybrid way to compute the correction vectors, and a FFT-based preconditioner to solve the standard eigenvalue problem. For the solution of the nonlinear eigenvalue problem, the research team led by Wen-Wei Lin, together with Tsung-Ming Huang and Volker Mehrmann propose a Newton-type iterative method and the nullspace-free method is applied to exclude the zero eigenvalues from the associated generalized eigenvalue prob-

lem. To find the successive eigenvalue/eigenvector pairs, they propose a new non-equivalence deflation method to transform converged eigenvalues to infinity, while all other eigenvalues remain unchanged. The deflated problem is then solved by the same Newton-type method, which is used as a hybrid method that combines with the Jacobi-Davidson and the nonlinear Arnoldi methods to compute the clustering eigenvalues. Intensive numerical experiments show that the proposed methods are robust even for the case of computing many clustering eigenvalues in very large problems.

d. Particle Swarm Stepwise Algorithm (PaSS) on Multicore Hybrid CPU-GPU Clusters.
Variable (feature) selection is a key component in artificial intelligence. One way to perform variable section is to solve the information-criterion-based optimization problems. These optimization problems arise from data mining, genomes analysis, machine learning, numerical simulations, and others. Particle Swarm Stepwise Algorithm (PaSS) is a stochastic search algorithm proposed to solve the information-criterion-based variable selection optimization problems. It has been shown recently that the PaSS outperforms several existed methods. However, to solve the target optimization problems remains a challenge due to the large search spaces. The research team led by Weichung Wang, together with Mu Yang, Ray-Bing Chen and I-Hsin Chung tackles this issue by proposing a parallel version of the PaSS on clusters equipped with CPU and GPU to shorten the computational time without compromise in solution accuracy. They have successfully achieved near-linear scalability on CPU with single to 64 threads and gained further 7X faster timing performance by using GPU.

e. Sequential Designs Based on Bayesian Uncertainty Quantification in Sparse Representation Surrogate Modeling.
A numerical method, called overcomplete basis surrogate method (OBSM), was recently proposed, which employs overcomplete basis functions to achieve sparse representations. While the method can handle nonstationary response without the need of inverting large covariance matrices, it lacks the capability to quantify uncertainty in predictions. The research team led by Weichung Wang, together with Ray-Bing Chen and C. F. Jeff Wu addresses this issue by proposing a Bayesian approach that first imposes a normal prior on the large space of linear coefficients, then applies the Markov chain Monte Carlo (MCMC) algorithm to generate posterior samples for predictions. From these samples, Bayesian credible intervals can then be obtained to assess prediction uncertainty. A key application for the proposed method is the efficient construction of sequential designs. Several sequential design procedures with different infill criteria are proposed based on the generated posterior samples. Numerical studies show that the proposed schemes are capable

of solving problems of positive point identification, optimization, and surrogate fitting.

f. A new stabilized linear finite element method for reaction-convection-diffusion equations.
In this work, the research team led by Suh-Yuh Yang proposes a new stabilized linear finite element method for solving reaction-convection-diffusion equations with arbitrary magnitudes of reaction and diffusion. The key feature of the new method is that the test function in the stabilization term is taken in the adjoint-operator-like form $-\varepsilon\Delta v - (\boldsymbol{a}\cdot\nabla v)/\gamma + \sigma v$, where the parameter γ is appropriately designed to adjust the convection strength to achieve high accuracy and stability. They derive the stability estimates for the finite element solutions and establish the explicit dependence of L^2 and H^1 error bounds on the diffusivity, modulus of the convection field, reaction coefficient and the mesh size. The analysis shows that the proposed method is suitable for a wide range of mesh Péclet numbers and mesh Damköhler numbers. More specifically, if the diffusivity ε is sufficiently small with $\varepsilon < \|\boldsymbol{a}\|h$ and the reaction coefficient σ is large enough such that $\|\boldsymbol{a}\| < \sigma h$, then the method exhibits optimal convergence rates in both L^2 and H^1 norms. However, for a small reaction coefficient satisfying $\|\boldsymbol{a}\| \geq \sigma h$, the method behaves like the well-known streamline upwind/Petrov-Galerkin formulation of Brooks and Hughes. Several numerical examples exhibiting boundary or interior layers are given to demonstrate the high performance of the proposed method. Moreover, they apply the developed method to time-dependent reaction-convection-diffusion problems and simulation results show the efficiency of the approach. The findings of this research just published in a recent issue of the top journal in computational mechanics, *"Computer Methods in Applied Mechanics and Engineering (2016)."*

g. A simple direct-forcing immersed boundary projection method with prediction/correction for fluid-solid interaction problems.
In this work, the research team led by Suh-Yuh Yang proposes a simple prediction-correction approach in conjunction with a direct-forcing immersed boundary projection method for simulating the dynamics of fluid-solid interaction problems, in which each immersed solid object can be stationary or moving in the fluid with a prescribed velocity. The main idea of this method is based on the introduction of a discrete virtual force which is distributed only on the immersed solid bodies and appended to the fluid momentum equations to accommodate the no-slip boundary condition at the immersed boundaries. More specifically, based on the rate of moment changes of the solid bodies, they first predict the virtual force at the grid points by using the difference between the prescribed solid velocities and the computed velocities obtained by applying the projection method to solve the incompressible Navier-Stokes equations on the whole domain in the absence of im-

mersed solid objects. This predicted virtual force is then added to the fluid momentum equations as an additional forcing term and they again employ the projection method to correct the velocity field, pressure and virtual force. Such prediction-correction procedure can be iterated to generate a more general method, if necessary. Numerical experiments of several benchmark problems are performed to illustrate the simplicity and high performance of the prediction-correction approach. They also find that our numerical results are in very good agreement with the previous works in the literature and in most cases, one correction at each time step is good enough. This work will be submitted to an international journal soon for possible publication.

6.4 Future Prospects

In the coming year of 2018, we will continue focus on several main topics such as electric double layers, ion channels, ecological interaction networks, phytoplankton and cancer stem cells. For the study of electric double layers and ion channels, we will analyze the Poisson-Boltzmann and Poisson-Nernst-Planck type systems and develop numerical schemes to get effective results which are comparable to experimental results. On the other hand, we will study the current signals of potassium channels (which come from experiments) to see the diffusion of gating and construct mathematical models. For the study of ecological interaction networks, we aim to further develop new Empirical Dynamic Modeling (EDM) methods to recover the dynamic from time series data. In particularly, we will focus on using EDM to 1) study interaction network, and 2) develop early warning signal for predicting critical transition of systems. These methods will be evaluated using models and real world systems. For the study of phytoplankton, we will investigate competing system consisting of two phytoplankton species with inorganic carbon and internal storage in a partially mixed habitat. The other extension of the model is to include the factors of respiration and light availability since carbon is lost by respiration and the light reaction of photosynthesis provides the energy for carbon assimilation. Furthermore, we will investigate a system that combines the structured population model with the physical transport equations governing spatial distributions of populations and resources. For the study of cancer stem cells, last academic year we have employed the sensitivity analysis of chemical networks developed by Mochizuki and Fiedler (2013) to suggest that the inhibition of E2F6 protein on the transcriptional rate of miR193a is necessary for overexpression of the oncogene c-kit. The experimental results performed by our biological partners also support this suggestion. This year we will apply the sensitivity analysis to see whether the other microRNA (miR124 and miR137) can be involved in the underlying network, and then conduct experiments to support our theoretical results.

a. The potential visitors: King-Yeung Lam, (OSU), Marc Thiriet (INRIA-UPMC-CNRS) Bob Eisenberg, (Rush Univ.), Hau-tieng Wu (Duke)

b. The possible workshops and short courses On December 2018, we will organize one international workshop on Complex and Biological fluid dynamics with applications. On summer 2018, we will have a short course on Mathematical Modeling and Analysis of Infectious Diseases. On summer 2018, we will have a short course on Modeling, Simulation and Analysis of atmospheric science. A brief description is stated as follows: Atmospheric science is an interdisciplinary field of study that involves components of chemistry and physics for studying the phenomena of Earth's atmosphere, and applied mathematics tools, such as differential equations, vector analysis, scientific computing and stochastics process, can be very useful to study the structure and dynamics of these phenomena. For example, mathematical modeling methods are applied to formulate cloud formation and scientific computing methods are used to conduct weather forecast. The goal of this course is to enhance and expand research relationships among mathematical science communities and providing platforms for students who are interesting in these topics.

c. Seminar on interdisciplinary researches: We will organize the regular seminar (every Thursday or Friday afternoon) for the coming academic year.

7 Program F. Interdisciplinary Research

7.1 Core Members

a. Organizers: Chih-Hao Hsieh (NTU, Institute of Oceanography), Sze-Bi Hsu (NTHU), Tzyy-Leng Horng (FCU), Je-Chiang Tsai (NTNU), Feng-Bin Wang (CGU)

7.2 Program Overview

We have four projects which focus on the following topics.

a. Modeling, simulation and analysis of electric double layers
Continuing from the focus topics of Project I last year, we mainly study ion transport through channels and electric double layers with applications on biological ion channels and supercapacitances, respectively. We derived and justified Poisson-Boltzmann and Poisson-Nernst-Planck type equations by mathematical theorems and numerical simulations. Under a wide range of conditions, numerical results of gating currents and differential capacitances are comparable to experimental results. Besides the regular seminar, we organize short courses to introduce scientific backgrounds and mathematical techniques for some specific topics.

b. Life history traits and exploitation affect the spatial mean-variance relationship in fish abundance We have focused on developing ecological theory and statistical approaches and then testing theory and methods using empirical data. The research topics include fisheries and environmental assessments.

c. Models of harmful algae with toxin degradation
Hsu and his collaborator (Bo Deng, Maoan Han) study the existence of chaotic dynamics for the chemostat model of a food chain with three trophic levels. Hsu and his collaborators (ZhenZhen Chen and Ya-Tang Yang) study the global dynamics of a microbial species undergoing sequential evolution in a morbidostat. Sze-Bi Hsu and his collaborators (King-Yeung Lam and Feng-Bin Wang) present a PDE system modeling the growth of a single species population consuming inorganic carbon that is stored internally in a poorly mixed habitat. Feng-Bin Wang and his collaborators (Huicong Li and Rui Peng) investigate an SIS epidemic reaction-diffusion system with a linear source in spatially heterogeneous environment.

d. Mathematical models of cancer stem cell
This is a research project led by Je-Chiang Tsai. They focus on the following two aspects.

- 1. J.-C. Tsai and his collarators (X. Chen and Y. Wu) have analyzed a susceptible-infectious-susceptible (SIS) epidemiological model, proposed to explain an epidemiological phenomenon that pathogen spread does not necessarily keep pace with its host invasion.
- 2. J.-C. Tsai and his collarator (J. He) have analyzed study the classical Kermack-McKendrick epidemic model with standard incidence and latent period included. Previous studies focus on the case where the total population is fixed, and so the system can be reduced into a two-component system. By contrast, the total population is varied in the present model, and thus it cannot be reduced further.

7.3 Research Highlights

We obtained many important results in the past three years' program. In the following, we list some selective achievements.

a. Modeling, simulation and analysis of electric double layers

(1) Tzyy-Leng Horng, Francisco Bezanilla, Robert S. Eisenberg and Chun Liu study a continuum model for voltage sensor in ion channel. The voltage sensor depends on the movement of permanent charges of basic side chains in the changing electric field. Gating currents of the voltage sensor involve are now

known to depend on the back-and-forth movements of positively charged arginines through the hydrophobic plug of voltage sensor domain. Transient movements of these permanently charged arginines, caused by the change of transmembrane potential, further drag the S4 segment and induce opening/closing of ion conduction pore by moving the S4-S5 linker. This moving permanent charge induces capacitive current flow everywhere. A PNP-steric model of arginines and a mechanical model for the S4 segment are combined using energy variational methods in which all movements of charge and mass satisfy conservation laws of current and mass. The resulting 1D continuum model is used to compute gating currents under a wide range of conditions, corresponding to experimental situations. The model reproduces signature properties of gating current: (1) equality of on and off charge in gating current (2) saturating voltage dependence in QV curve and (3) many (but not all) details of the shape of gating current as a function of voltage.

[1] Tzyy-Leng Horng , Robert S. Eisenberg, Chun Liu, Francisco Bezanilla, 2017, Continuum gating current models computed with consistent interactions, submitted to Biophysical Journal.

(2) Tzyy-Leng Horng, Ping-Hsuan Tsai and Tai-Chia Lin study two different approach from energy variation method to obtain the concentration transport equation based on modifying the famous Bikermann model. With the further inclusion of excessive polarization, we then apply the model to study differential capacitance problem of a plane wall and compared with Valette's experimental data. Our computational result qualitatively well agrees with experimental data.

[2] Tzyy-Leng Horng, Ping-Hsuan Tsai and Tai-Chia Lin, 2017, Applying modified Bikerman model and excessive polarization to study differential capacitance problem, submitted to Molecular based Mathematical Biology.

(3) The virial theorem is a nice property for the linear Schr?dinger equation in atomic and molecular physics as it gives an elegant ratio between the kinetic and potential energies and is useful in assessing the quality of numerically computed eigenvalues. If the governing equation is a nonlinear Schr?dinger equation with power-law nonlinearity, then a similar ratio can be obtained but there seems no way of getting any eigenvalue estimate. Tai-Chia Lin develops a virial theorem and eigenvalue estimate of nonlinear Schr?dinger equations (which may describe photorefractive media in nonlinear optics) with square root and saturable nonlinearities, respectively. Furthermore, the eigenvalue estimate can be used to obtain the 2nd order term of the lower bound of the ground state energy as the coefficient of the nonlinear term tends to infinity. Besides, Tai-Chia Lin and Zhi-Qiang Wang (2015 NCTS visitor) improve the method of Cazenave and Lions (Comm Math Phys, 1982) and use a convex-

ity argument to prove the existence and orbital stability of ground states of saturable NLS equations and intensity functions.

[3] T.C. Lin, X. Wang and Z.Q. Wang, Orbital stability and energy estimate of ground states of saturable nonlinear Schr?dinger equations with intensity functions in R2, to appear in J. Diff. Eq.

[4] T.C. Lin, M.R. Belic, M.S. Petrovic, H. Hajaiej and G. Chen, The virial theorem and ground state energy estimate of nonlinear Schr?dinger equations in with square root and saturable nonlinearities in nonlinear optics, submitted.

b. Life history traits and exploitation affect the spatial mean-variance relationship in fish abundance

(1) Populations occasionally experience abrupt changes such as local extinctions, strong declines in abundance, or transitions from stable dynamics to strongly irregular fluctuations. Although most of these changes have important ecological and at times economic implications, they remain notoriously difficult to detect in advance. Here, we study changes in the stability of populations under stress across a variety of transitions. We demonstrated, using a theoretical model and two sets of empirical data, that elevated nonlinearity could be used as indicator to infer changes in the dynamics of populations under stress.

[1] Dakos, V., S. M. Glaser, C. H. Hsieh, and G. Sugihara (2017) Elevated nonlinearity as an indicator of shifts in the dynamics of populations under stress. Journal of the Royal Society Interface. 14: 20160845

(2) We show that natural Wolbachia infections are associated with unstable mosquito population dynamics by contrasting Wolbachia-infected versus uninfected cage populations of the Asian tiger mosquito (Aedes albopictus). By analyzing weekly data of adult mosquito abundances, we found significantly higher variability and nonlinearity but lower predictability in the infected populations than that of the uninfected. A mathematical model analysis suggests that Wolbachia may alter mosquito population dynamics by modifying larval competition of hosts.

[1] Telschow, A., F. Grziwotz, P. Crain, J. Mains, T. Miki, G. Sugihara, S. Dobson, C. H. Hsieh (in press) Infections of Wolbachia may destabiliz mosquito population dynamics. Journal of Theoretical Biology

c. Models of harmful algae with toxin degradation

(1) We consider a classical chemostat system that models the cycling of one essential abiotic element or nutrient through a food chain of three trophic levels. From the configuration of the nullclines of the equations that generates the singular homoclinic orbits, a shooting algorithm is devised to find such Shilnikov

saddle-focus homoclinic orbits numerically which in turn imply the existence of chaotic dynamics for the original chemostat model.

[1]Numerical proof for chemostat chaos of Shilnikov type, (Sze-Bi Hsu, Bo Deng , Maoan Han) Chaos, Vol 27, Issue 3 (2017)

(2) A morbidostat is a bacteria culture device that maintains a nearly constant microbial population for the selection of drug-resistant mutants via a feedback algorithm. We prove the extinction and uniform persistence of all species with both forward and backward mutation in a sequential evolution scenario. The theoretical framework elucidates the generic features of the operation of a morbidostat under drug-inhibitor-induced feedback, and will provide a useful aid for the design of experiments.

[2] The Morbidostat: A Bio-reactor that promotes selection for dry-resistance in bacteria (Zhenzhen Chen, Sze-Bi Hsu,Ya-Tang Yang) , SIAM J. Applied Mathematics 77-2 (2017) p.470-499

(3) We investigate a PDE system modeling the growth of a single species population consuming inorganic carbon that is stored internally in a poorly mixed habitat. A threshold type result on the extinction/persistence of the species is established in terms of the sign of a principal eigenvalue associated with a nonlinear eigenvalue problem.

[3]Single species growth consuming inorganic carbon with internal storage in a partially mixed habitat. (Sze-Bi Hsu, Adrian Lam and Feng-Bin Wang) to appear in Mathematical Biology (2017) on line.

d. Mathematical models of cancer stem cell

We have used the Legendre series approach to give regularity results of solutions of parabolic equations with discontinuous nonlinearity on the two-dimensional sphere. This approach can also provide a sort of a priori estimates of solutions of equations on the two-dimensional sphere, with which existence of solutions in the model concerning the interaction between the B-cell membrane receptors and the membrane kinase molecules can be established.

[1] S. Bialecki, B. Kazmierczak, D. Nowicka, and J.-C. Tsai, Regularity of solutions to a reaction-diffusion equation on the sphere: the Legendre series approach, 2017, Mathematical Methods in the Applied Sciences, in press

8 Program G. Big and Complex Data Analysis (Open Call Program)

8.1 Core Members

a. Faculties: Meihui Guo (NSYSU); Ray-Bing Chen (NCKU),Mong-Na Lo Huang(NSYSU), Yun-Chan Chi (NCKU), Miin-Jye Wen (NCKU), Pei-Fang Su (NCKU), ChingKang Ing (Academia Sinica), Yu-Feng Huang (National Chung Cheng Univ.), Shih-Feng Hunag (NUK)

b. Postdocs: 1

c. Students: 10 Ph.D./80 Master

d. Long-term Visitors: Kerby Shedden (Michigan), Inchi Hu (HKUST)

8.2 Program Overview

In the following we focus on the international cooperation and activities.

a. Workshops and short courses:
We organized two workshops and one short course in the past half year. Several internationally renowned scholars were invited as keynote speakers of the workshops and short course. In 2017 summer, we will also organize a series of lectures in "High performance computing for computational and data science" at NSYSU. Details are given below.

- In 2016.12, we held a workshop on "Experimental Design and Uncertainty Quantification" at NCKU. There are 7 outstanding speakers, Prof. Dennis Lin (Penn Stat Univ.); Weng Kee Wong (UCLA); Prof. Hongquan Xu (UCLA); Dr. Xu He (Chinese Academy Science); Dr. Shih-Hao Huang (Univ. of Michigan Ann Arbor) Prof. Ying Hung (Rutgers Univ.) and Prof. Matthias Hwai Yong Tan (City Univ. of Hong Kong) and presented their on-going works on experimental design and uncertainty quantification related researches.
- We invited Prof. Inchi Hu (Hong Kong University of Science and Technology) to give a mini-course on high dimensional data analysis at NCTS in 2016.11.15-2017.2.15. Prof. Hu gave the following four lectures: (1)False Discovery Rate and Multiple Testing-A Selected Review; (2)A Review of L1 Regularized Regression Related Concepts and Results; (3)An Outsider's Review of Deep Learning Part I; (4)An Outsider's Review of Deep Learning Part II. Prof. Hu gave the first two lectures at NCTS (National Center for Theoretical Sciences) and the last two lectures at NSYSU. All the four lectures are video-recorded and online.

- We organized a one-day workshop, Bayesian Data Analysis and Computation, on March 17, 2017. In this workshop, our speaker was Dr. Fang Chen, the senior manager in SAS. He briefly introduced the Bayesian related packages in SAS.
- Prof. Chieh-Sen Huang will organize three lectures in "High performance computing for computational and data science" in 2017 summer at NSYSU. The topics of the three lectures are: (1)Introduction to MPI (Message Passing Interface). (2)Introduction to parallel computing in data science - R+Hadoop+Spark. (3)Introduction to GPU using CUDA.

b. Encourage domestic young researchers to attend international conferences and have short term visits:
It is important to encourage young faculties to attend international conferences and have short term academic visiting. These activities help young researchers to build their international connections and explore their research fields.In the second half of 2017, Mr. Ping Yang Chen, the PhD student in Dept. Stat., NCKU, will attend Design and Analysis of Experiments (DAE) conference and take chance to visit Dept. of Biostat., UCLA to continuous his joint projects with Prof. W. K. Wong. In Dec., 2017, Prof. R.-B. Chen will attend an international conference, 10th IASC Asian Conference on Statistical Computing, in New Zealand.

c. Build international research cooperations:
The followings are the ongoing international research cooperations.

- The joint work with the Vanderbilt Center for Quantitative Sciences (CQS): This research center is led by Dr. Yu Shyr. CQS coordinates and integrates the work of Vanderbilt University and Medical Center quantitative scientists across the disciplines of biostatistics, bioinformatics, biomathematics, computational biology, biomedical engineering, and other related fields. The center is available to all university and medical center investigators, offering collaborative support spanning traditional statistical inputs (e.g., experimental design, sample size determination, power analysis, conventional data analysis and results interpretation), to novel statistical and bioinformatics approaches for modern technologies (e.g., advanced sample size determination for next-generation sequencing, multivariate modeling for high-dimensional data), to systems and computational biology approaches for asking questions and modeling results. Currently Prof. R.-B. Chen; Prof. K-J Lee and Prof. P.-F. Su have several joint works with CQS in Vandernilt Univ.
- The new joint work on Data Analysis in Experimental Designs: This new joint work was motivated by our one-day workshop (2016.06.30). In this workshop, Prof. S.-H. Lo (Columbia Univ.) introduced the "I-score" method and its appli-

cations in bioinformatic data analysis. Currently Prof. M.-N. Lo Huang; Prof. S.-H. Lo and Prof. R.-B. Chen form a research team, and they target on a novel data analysis approach in experimental designs based on I-score approach. In the current stage, they do propose a multi-stage screening procedure for the supersaturated design analysis and successfully illustrate the performance of the proposed method based on several standard test examples. Now they start preparing the technique report and will submit it to an international journal soon.

- Prof. Meihui Guo invited Prof. Inchi Hu (Hong Kong University of Science and Technology) to visit NSYSU from 11/15/2016 to 2/15/2017. They worked on the following research problems (i) Importance Sampling for Conditional Tail Expectation. (ii)Smoothing Spline in Likelihood Inference. (iii) Study on the I-score approach.

8.3 Research Highlights

Our program includes several working groups that address specific issues, but not limited to, such as experiment design, high frequency financial data, scientific computation, biostatistics and etc. In the following we list three hightlighted topics.

a. Efficient Swarm Intelligence Approaches for Experimental Design Generators
   In last five years, we have worked on the numerical approaches for experimental design generations. The key idea is to transfer the design generation problem as an optimization problem. Algorithms for obtaining experimental designs have been extensively studied in the literature. In the course of this endeavor, numerous algorithms have been proposed, from Fedorov-Wynn type algorithms to exchange algorithms, mathematical programming, and evolutionary algorithms, to name just a few. For a detailed account of algorithms for optimal designs.

   Recently we move to the two-level factorial related design problems. We have completed two projects on two-level supersaturated design and two-level orthogonal array with pre-specified model structure.

   - Two-level orthogonal arrays are most commonly used in industrial experiments to identify active effects because they allow for the joint estimation of all main effects and interactions. In some experiments, the experimenter wants to estimate a set of specified effects, which is known as a *requirement set* that consists of all main effects and some specified two-factor interactions (2fis). [**?**] investigated the existence of such orthogonal arrays and provided a construction principle. [**?**] further derived theoretical results for finding D-optimal orthogonal arrays for jointly estimating main effects and some specified 2fis.

- Two-level supersaturated design (SSD) with N runs and m factors can be represented by an $N \times m$ matrix X with every entry equal to $+1$ or -1. In SSD, we assume that $N < m$ for run-size economy and no two columns of X are identical. In addition, we also take the balance property into account. It means that $+1$ and -1 levels of each factor, i.e. each column in X, appear the same number of times. The balance property is important because it ensures that the main effects and interactions are orthogonal.

b. Analysis of High Frequency Financial Data

Thanks to advances in data acquisition and processing techniques, financial data taken at a finer time scale such as tick-by-tick data have become readily available. These high frequency (HF) transaction data provide a rich source of real-time market information as to trading processes and market microstructure. Incorporation of real-time information helps to improve decision making in the rapidly changing markets. However, how to manage the huge real-time data and draw useful information are new challenges to researchers and market practitioners. In Big and Complex Data Analysis Program, we have a team working on the analysis of high frequency financial data including modeling, estimation and testing as well as multi-asset derivative pricing and model risk assessments. Our research outcomes are published in major journals in statistics and quantitative finance such as Annals of the Institute of Statistical Mathematics, Bernoulli Journal, Journal of Multivariate Analysis, TEST, Applied Stochastic Models, Quantitative Finance and etc. The following lists some of our research highlights (2015-2017):

- Liang-Ching Lin and Meihui Guo (2015, Annals of the Institute of Statistical Mathematics). We propose an optimal restricted quadratic estimator of integrated volatility for intra-daily high frequency transaction data.
- Meihui Guo, Yi-Ting Guo, Chi-Jeng Wang and Liang-Ching Lin, (2015, Journal of Applied Statistics). We establish a scheme to identify the influential trades from the ordinary trades under certain criteria.
- Ching-Kang Ing, Hai-Tang Chiou and Meihui Guo, (2016, Bernoulli Journal). This work aims at estimating inverse autocovariance matrices of long memory processes admitting a linear representation. A modified Cholesky decomposition is used in conjunction with an increasing order autoregressive model to achieve this goal. The spectral norm consistency of the proposed estimate is established.

Our team aims to make breakthroughs in analyzing high frequency financial data: (a) Establish the sparse location dispersion model for microstructure noise. (b) Estimate integrated volatility incorporating the sparse location dispersion model. (c) Propose goodness of fit tests for stochastic volatility model incorporating the sparse

location dispersion model. (d) Estimate Self-exciting and cross-exciting integrated volatility and jumps in the HF world. (f) We will adopt functional time series model to analyze the high frequency demand/supply curves in a limit order book. (e)Integrate the SDEs of the three order types to study the dynamics of a LOB.

c. High Order Numerical method of Hyperbolic Conservation Laws
Prof. Chieh-Sen Huang and his research team have worked on Eulerian-Lagrangian methods for transport problems for about ten years. They are most interested in extending the ideas to nonlinear problems. Since the stream-tube and Strang splitting techniques are essentially one-dimensional, they continue to investigate the one-dimensional nonlinear problem. The main difficulty of the nonlinear problem is that the velocity is solution dependent, and thus it is not possible to determine the tracelines a-priori. Their first method for two-phase flow uses a combination of mass and volume balance constraints on the two phases. However, these constraints do not uniquely identify the trace-back regions for transport, and so a local (constrained) optimization step is added which seeks to identify an approximate traceline that has consistency between the previous time-level saturation and the backward traced, dynamically evolved saturation. The method is able to handle very complex shock structures. However, it is relatively computationally expensive and not very robust to solve the optimization problem.

   In 2015, they presented a general idea to extend the WENO reconstructions to a class of numerical schemes that update different moments simultaneously as the computational variables. The key is to properly devise a re-mapping formulation to convert the multi-moment values to either the cell average or point value, which can be then directly used to generate the WENO reconstructions. The WENO reconstructions in turn provide the numerical approximations for the flux functions and other required quantities.

   The numerical tests demonstrate that the presented methods have over fifth-order accuracy as expected and effectively eliminate spurious oscillations. The numerical solutions to all benchmark tests are of good quality and comparable to other existing WENO schemes.

8.4 Future Prospects

In the future, we will continue to the following events:

a. Workshops and short courses: We plan to regularly have a workshop on December. In addition, we would like to organize related mini-workshops or short courses to introduce the new developments in Data Science or the subfields in Statistics, like biostatistics, experimental design, financial statistics and so on. Hopefully these

mini-workshop or short courses can provide chances for researchers and graduate students to share their ideas and research experiences.

b. Encourage domestic young researchers to attend international conferences and have short term visits: We will continuous encouraging faculties and PhD students to attend the international conferences or to have short term academical visiting. We believe this would help them to explore their international connections and to find the new cooperation opportunities.

c. Build international research cooperations: In this year, new international research cooperations have been formed in our program. It is always important to catch up these top researches in the world. Thus we would like to have more international visitors. These visitors do not only share their own novel research results with us but also give us chances to have new research cooperations.

d. We plan to organize a two-day data science summer camp for undergraduate students and a five-day data science training program for graduate students in the summer of 2018.

9 Program H. Harmonic Analysis (Open Call Program)

9.1 Core Members

a. Faculties: Xiang Fang (NCU), Hwa-Long Gau (NCU), Ming-Yi Lee (NCU), Chin-Cheng Lin (NCU), Duy-Minh Nhieu (NCU), Chun-Yen Shen (NCU)

b. Postdocs: Ming-Hsiu Hsu, Zipeng Wang

c. Students: 2 Ph.D./ 11 Master

d. Long-term Visitors: Yongsheng Han (Auburn U.) Denny H. Leung (NUS), Sen Zhu (Jilin U.)

9.2 Research Highlights

a. Two weight quasi-$T1$ theorems with common point mass:
Let σ and ω be locally finite positive Borel measures on $\mathbb{R}^n$ (possibly having common point masses), and T^α be a standard α-fractional Calderón-Zygmund operator on $\mathbb{R}^n$ with $0 \leq \alpha < n$. Suppose that $\Omega : \mathbb{R}^n \to \mathbb{R}^n$ is a globally biLipschitz map, and refer to the images ΩQ of cubes Q as *quasicubes*. Assuming the side conditions: energy conditions, then we show that T^α is bounded from $L^2(\sigma)$ to $L^2(\omega)$ if and only if $T1$ conditions hold. This is the most general two weight $T1$ theorem to be

known to date in the following two perspectives:
(1) It works for a very general class of singular integral operators
(2) It allows the measures can have common point masses. (This technical case turns out to be extremely difficult, and was overcome in this paper)
Moreover, we proved that the energy conditions are necessary when the measures are k-energy dispersed. Measures that are k-energy dispersed include doubling measures, A-D regular measures, and measures with similarity such as cantor measure in the plane.

b. A General two weight $T1$ theorems for fractional singular operators:

Let σ and ω be locally finite positive Borel measures on $\mathbb{R}^n$ with no common point masses, and let T^α be a standard α-fractional Calderón-Zygmund operator on $\mathbb{R}^n$ with $0 \leq \alpha < n$. Furthermore, assume as side conditions *α-energy conditions*. Then we show that T^α is bounded from $L^2(\sigma)$ to $L^2(\omega)$ if the cube testing conditions hold for T^α and its dual, and if the weak boundedness property holds for T^α.

Conversely, if T^α is bounded from $L^2(\sigma)$ to $L^2(\omega)$, then the testing conditions hold, and the weak boundedness condition holds. If the vector of α-fractional Riesz transforms $\mathbf{R}_\sigma^\alpha$ (or more generally a strongly elliptic vector of transforms) is bounded from $L^2(\sigma)$ to $L^2(\omega)$, then the $\mathcal{A}_2^\alpha$ conditions hold.

The innovations in this higher dimensional setting are the control of functional energy by energy modulo $\mathcal{A}_2^\alpha$, the necessity of the $\mathcal{A}_2^\alpha$ conditions for elliptic vectors, the extension of certain one-dimensional arguments to higher dimensions in light of the differing Poisson integrals used in $\mathcal{A}_2$ and energy conditions, and the treatment of certain complications arising from monotonicity property. The main obstacle in higher dimensions is thus identified as the pair of energy conditions.

c. Weighted Hardy space and Carleson measure space associated with a family of general sets:

We establish a theory of weighted maximal function estimates and weighted Hardy spaces associated with a family of sets on a topological space endowed with a non-negative Borel measure. The conditions on the family of sets correspond to standard conditions on families of balls on Euclidean spaces or spaces of homogeneous type. We define weighted atomic Hardy spaces, and characterise the dual space as a weighted BMO type space. Under the stronger assumption of a space of homogeneous type with polynomial volume growth, we give an equivalent definition of the atomic Hardy space in terms of maximal functions, and show the weighted BMO type space can be characterized by the weighted Carleson measure.

d. Fiber dimension for invariant subspaces:

Fiber dimension is a useful invariant in operator theory, but can only be defined on Hilbert spaces of analytic functions in the past. For general Hilbert space operators,

there is a lack of analytic structure. In "Fiber Dimension for Invariant Subspaces", inspired by Samuel multiplicity in Commutative Algebra, we found a new way to represent fiber dimension in terms of an asymptotic formula

$$\mathrm{fd}(M) = \lim_k \frac{\dim(P_k(M))}{k},$$

where P_k is a truncation of an invariant subspace M at degree k. This allows us to define an abstract notion of fiber dimension, and to obtain new results, even for Hilbert spaces of analytic functions. In particular, we discover an additivity formula

$$\mathrm{fd}(M_1) + \mathrm{fd}(M_2) = \mathrm{fd}(M_1 \cap M_2) + \mathrm{fd}(M_1 \vee M_2),$$

whose form did not appear before, and it greatly generalizes a classical estimate called the codimension-n inequality: $\dim(M) \leq n$, which becomes trivial with our new formula.

10 Program L. Laboratory of Data Science

10.1 Core Members

a. Faculties: Hau-Tieng Wu (Duke), Weichung Wang (NTU), Mao-Pei Tsui (NTU), I-Liang Chern (NTU), Yu-Chen Su (NCKU), Ting-Li Chen (AS), Su-Yun Chen (AS)

b. Participants: David Liao (NTUH), Chia-Jun Wang (NTUH), Allen Lo(Chang Geng Hospital), Yu-Ting Lin (Shin-Kong Hospital), Sheng-Gwo Chen (Chia-Yi Univ.)

c. Postdocs: 1

10.2 Overview of the Program

We launched the Laboratory of Data Science of National Center for Theoretical Sciences in 2016. This is in response to the increasing need of the society to the emerging fundamental challenges in data science. The main goal of LDS of NCTS is to study the mathematical models for data processing in medical research. The current research group consists of pure and applied mathematicians, statisticians, physicians and more. Other than project-oriented small group meetings, the Forum of Data Science is organized every month as a platform for mathematicians, statisticians, physicians and other experts to gather for idea exchange and problem solving. There are already some other collaborations initiated by this program ongoing.

10.3 Research Highlights

The main research focus is the interdisciplinary study bridging medicine and mathematics. In the past year, at least two projects were carried out in this direction.

a. Diffusive sensor fusion signal processing framework with an application to the automatic sleep dynamics annotation (Gi-Ren Liu, Yu-Lun Lo, Hau-Tieng Wu)

   With the technological advance in the last decades, more and more physiological signals could be recorded simultaneously. While each signal contains information about our physiological dynamics, the recorded information is partial. Integrating these pieces of partial information is critical to better understand the physiology, and hence the medical application. This is commonly called the sensor fusion problem. While there have been a lot of efforts in this direction (for example, kernel CCA), less is considered to take simultaneously the nonlinearity and topological structure into account to fuse information.

   In this study, motivated by the automatic sleep dynamics annotation challenge in the sleep equipped with the modern multi channel physiological signal recording system, we focus on extending and establishing the theoretical background of the recently considered alternating diffusion framework under the manifold setup in the field ([1]). In brief, the alternating diffusion algorithm constructs the common information shared by different channels, and hence leads to a better prediction outcome.

   Finding a proper model for the nonlinear dynamics and an associated algorithm is the key step toward a more delicate understanding of different physiological dynamics, which could lead to a more accurate sleep dynamics evaluation. Manifold is a natural low dimensional model suitable to host such a nonlinear dynamical system, although in general it is not possible to explicitly write it down. The problem is further complicated by the nonlinear relationship between different channels and the undesired nuisance parameters with the possibly nontrivial topology. The lately developed common manifold model, and the alternating diffusion, pioneered by the co-PI Hau-tieng Wu ([2]), is suitable for this kind of problem and has been successfully applied to several problems in the last year ([5, 4])

   Human being spends 1/3 of his life time in sleep, which is an recurrent physiological dynamics that has been well known to be closely related to human health status. In the past decades, due to the advances of physiological acquirement techniques, like polysomnography, we could more easily access the sleep quality. Although there have been many research results, however, a satisfactory automatic annotation of sleep dynamics is still lacking, particularly on the mobile device level. It is well known that information in different channels might nonlinearly overlap and

be nonlinearly contaminated by nuisance with possible nontrivial topology; however, little effort was invested to deal with this kind of problem. In this project, we propose to apply the modern time series analysis technique to extract sleep features from at least two different physiological signals, quantify the sleep dynamics by the nonlinear manifold model, and reconstruct the intrinsic features for the sleep dynamics by the sensor fusion algorithm alternating diffusion. A preliminary result based on the respiratory signals was published in ([4]). One novel algorithmic study focusing on merging more channels is reported in [3], and a large scale study based on EEG signal is under preparation ([5]). Since the algorithm could be applied to as few channels as possible, like two, it has the potential to be applied to the trendy mobile device approach to evaluate the sleep dynamics. This is an ongoing project we are collaborating with the commercial company based on Taipei Medical University Hospital now.

[1] Talmon & Wu, Latent common manifold learning with alternating diffusion: analysis and applications, minor revision in Applied and Computational Harmonic Analysis

[2] R. Lederman & R. Talmon & H.-T. Wu, Empirical Recovery of Data Geometry using Alternating Diffusion, ICML 2016, Talmon & Wu, Latent common manifold learning with alternating diffusion: analysis and applications, minor revision in Applied and Computational Harmonic Analysis

[3] R. Lederman & R. Talmon & H.-T. Wu & Y.-L. Lo & R. R. Coifman, Alternating diffusion for common manifold learning with application to sleep stage assessment, ICCASP, 2015

[4] O. Katz & R. Talmon & Y.-L. Lo & H.-T. Wu, Diffusion-based nonlinear filtering for multimodal data fusion with application to sleep stage assessment, submitted

[5] G.-R. Liu & Y.-C. Sheu & Y.-L. Lo & H.-T. Wu, Inter-individual sleep dynamics prediction based on ConceFT and Alternating diffusion, in preparation.

b. Differential geometry approach to hemodynamics (Yu-Ting Lin & Hau-Tieng Wu)

Hemodynamics is an old field. It lays the physiological foundation for different clinical application. While it has been widely studied and developed, however, our understanding about its intrinsic mechanism is still limited and it is well recognized that quite a lot of hidden information is left unexplored. The problem becomes more challenging if we take the intrinsic nonstationarity into account. In this project, we propose to combine the differential geometry techniques and and the time series analysis tools to study the pulse-related signals, like the photophlethysmogrpahy signal and the A-line signal commonly recorded in the operation room. Particularly, the nonstationarity will be taken into account and quantified, and the

intrinsic hemodynamic mechanism will be evaluated. Motivated by the clinical needs, the results will be applied to study the hidden information that could be applied to predict the noxious stimulation and anesthesia depth.

Although hemodynamics is nonstationary, it is well known that the homeostasis holds on the qualitative level. The differential geometry approach leverages the core thinking process that the variation of the hemodynamics could be well approximated by an unknown low dimensional manifold. The main technique we apply and will be further developed by taking the hemodynamics characteristics into account, the diffusion map, could reconstruct this low dimensional manifold and hence the dynamics. In the preliminary dataset, it is shown that the algorithm based on the differential geometry approach, called the diffusion map, could well differentiate noxious stimulation. The preliminary result will be presented in the 2017 Canadian Anesthesiologists' Society annual meeting, with the title "Transient heart rate changes differentiate noxious stimulation during general anesthesia" with Dr. Yu-Ting Lin.

10.4 Future Plan

Manifold learning and medical signal processing are two distinct and hot fields and historically there is a limited interaction. The above studies have shown the potential of bridging these two fields, which would lead to a new interdisciplinary research. One particular challenging problem in the modern physiological signal processing is the sensor fusion. In addition to its theoretical background development, by combining the manifold learning to fuse the nonlinear aspect of the common information is an innovative approach. The above research direction will definitely be continued in the future.

To enhance the high quality personnel training in Taiwan, particularly the talents bridging medicine and math, we will establish a more formal channel for medical students with interest to math/data science. Also, we will equally provide a formal channel for math students to involve in the medical data analysis. A joint topic course in mathematics and medicine to attract students' attention is under consideration. To explore international collaboration, we will extend the MOU between NTUH and Department of Mathematics in Duke, particularly the MISTA data lab led by Dr. Hau-tieng Wu, so that medical students with interest have a chance to visit other fields in their intern life. The connection between National Yang Ming University and MISTA is also under consideration.

On the data side, in the coming year we plan to focus on establishing one large scale high quality database. Dr. Yu-Lun Lo and Dr. Hau-tieng Wu will help connect medical centers in Taipei to accumulate a larger whole night sleep database for a larger scale research, and determine the clinical research directions. NCTS will help

human resource and computer resources to host the database. In the beginning, the database will be promoted by NCTS to visitors from different countries, which will help promote Taiwan.

11 Appendix

11.1 Host institution's commitment

申請機構配合事項同意書

計畫名稱：國家理論科學研究中心第四階段運作計畫(2015.1.1-2020.12.31)

計畫主持人姓名/職稱：陳榮凱/教授

申請機構配合措施：本計畫業經單位內部審查，同意提供下列配合事項。

一、 配合款：本機構同意提供2000萬之配合款，於執行期間優先使用於計畫所需各項經費（含中心人員薪資、學術活動費用、使用空間的場租、軟硬體設備、裝修維護費、水電雜支等等）。本計畫執行期滿後，收支報告表內需詳細註明配合款支用情形。

二、 員額：提供 5 名供中心延聘中心主任、中心講座、特約中心科學家。

三、 管理費：依本校「建教合作計畫管理費分配處理細則」辦理，以科技部計畫15%管理費計，分配至計畫主持人所屬學院2%，分配至校級中心之管理費約30%。

四、 結餘款：依本校「建教合作計劃結餘款分配、運用及管理要點」辦理，當年度結餘款總額扣除個別使用款項後之餘額，校級中心以分配50%為原則。

五、 中心空間：

1. 現況：

a. 專屬空間共約 361 坪：

天文數學館	二樓 (約 183 坪)	中心行政區，小型研討室(30 人)及大型研討室(120 人)各 1 間，4 間訪問學者辦公室與交誼區；走道公共空間設有沙發及茶水區，為公告區及休息討論區。
	四樓 (約 76 坪)	5 間訪問學者辦公室、1 間視訊會議室、2 間討論室和 1 間辦公室(供研究助理使用)。
數學研究中心	二樓 (約 66 坪)	5 間辦公室(供博士後研究員使用)及休息區。
	三樓 (約 36 坪)	6 間訪問學者辦公室。

b. 共同使用空間共約 255 坪：

天文數學館	一樓 (約 180 坪)	3 間中小型教室(80 人、80 人、20 人)和 1 個國際會議廳(198 人)。
	九樓 (約 75 坪)	接待、交誼、會議或相關學術活動使用空間。

2. 宇宙學大樓於2016年落成之後：

a. 專屬空間共約 502 坪：

宇宙學大樓	4 樓(200 坪) 5 樓(200 坪) (2 層樓 400 坪為數學組與物理組共用)	辦公室、小型會議室與研究室。
	其他樓層 (數學組另行租借 200 坪)	辦公室、小型會議室與研究室。
數學研究中心	二樓 (約 66 坪)	5 間辦公室(供博士後研究員使用)及休息區。
	三樓 (約 36 坪)	6 間訪問學者辦公室。

b. 共同使用空間共約 150 坪：

宇宙學大樓	一樓 (150 坪)	大型演講廳(130 人)。

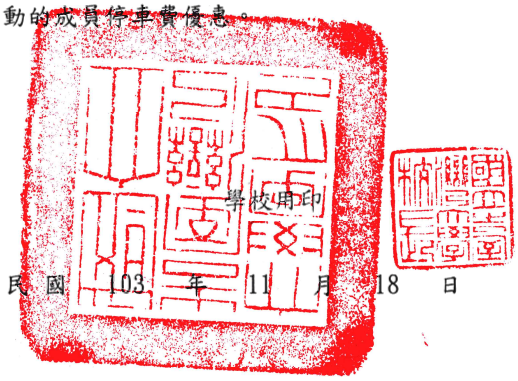
六、 其它相關配合措施：請詳細說明所提供之各項設備、學人宿舍、裝修維護費、水電雜支、停車、行政支援...等。

1. 中心主任與執行主任因推動中心業務，同意減免教學課程，依本校「教師核減授課時數」規定辦理。
2. 校方提供至少10名博士後研究員名額，以招募優秀年青研究人員。（薪資含配合款中）
3. 提供客座學人宿舍給國內外長期訪問學者。
4. 國內外學生至中心訪問期間的住宿得申請本校學生宿舍。
5. 提供一個月(含)以上中心訪客使用學校體育健身設施收費優惠。
6. 提供參加中心活動的成員停車費優惠。

此致

科技部

申請機構首長（簽章）：



中 華 民 國 103 年 11 月 18 日

11.2 List of Courses and Lectures

	Title	Dates	Venue	Speakers	Organizers
A1	NCTS Summer Short Course on Drinfeld modules and t-motives	2015/07/13-2015/07/24	NCTS	Fu-Tsun Wei (NTHU), Chieh-Yu Chang (AS)	Fu-Tsun Wei, Chieh-Yu Chang
A2	NCTS Fall Course: Representatoin Theory of Finite Groups of Lie Type	2015/09/22-2015/10/02	NCTS	Chia-Fu Yu (AS)	Chia-Fu Yu
A3	NCTS Fall Course: Abelian Barietiesand Related Topics	2015/09/25-2015/09/29	NCTS	Chia-Fu Yu (AS)	Chia-Fu Yu
A4	NCTS Winter School on Shimura Varieties and Related Topics	2015/12/17-2015/12/31	NCTS	Miao-Fen Chen (ECNU), Sian Nie (CAS), Xu Shen (CAS), Chia-Fu Yu (AS)	Chia-Fu Yu
B1	NCTS Mini Course in Algebraic Geometry: Linear Systems on Algebraci Varities	2015/05/05-2015/05/19	NCTS	Caucher Birkar (Cambridge)	Jungkai Chen
B2	NCTS Lecture Series in Algebraic Geometry: Birational Geometry of 3-folds in char p	2015/08/11-2015/08/18	NCTS	Caucher Birkar (Cambridge)	Jungkai Chen
C1	NCTS Mini Course on Random Matrices	2015/06/26-2015/07/13	NCTS	Horng-Tzer Yau (Harvard)	Horng-Tzer Yau, Mao-Pei Tsui
C2	NCTS Summer School on Kerr Geometry	2015/08/17-2015/08/21	NCTS	Mao-Pei Tsui (NTU)	Mao-Pei Tsui, Yng-Ing Lee
C3	NCTS Distinguished Lecture Series	2015/10/12-2015/12/21	NCTS	Fan Chung Graham (UCSD)	Gerard Jennhwa Chang, Yng-Ing Lee, Mao-Pei Tsui
D1	NCTS/CMMSC Short Course in Probability	2015/03/23-2015/06/01	NCTU	Yuan-chung Sheu (NCTU)	Yuan-Chung Sheu
D2	NCTS Nini-course on Periodic Homogenization of Elliptic Problems	2015/03/23-2015/03/27	NCTS	Zhongwei Shen (UK)	Jenn-Nan Wang
D3	NCTS Short Course on Random Walks	2015/07/14-2015/07/28	NCTS	Lung-Chi Chen (NCU)	Yuan-Chung Sheu
D4	Mini-course on Cloaking and Invisibility	2015/07/21-2015/07/23	NCTS	Hongyu Liu (HKBU)	Jenn-Nan Wang
D5	2015 Summer Course on Dynamical Systems: Pattern Generation Problem and Spatial Entropy in Higher Dimensional Lattice	2015/07/21-2015/08/13	NCTS	Jung-Chao Ban (NDHU)	Jung-Chao Ban
D6	NCTS Short Course on Random Walks	2015/07/28	NTU	Lung-Chi Chen (NCCU)	Yuan-Chung Sheu
D7	NCTS Distinguished Lecture Series	2015/10/02-2015/10/04	NCTS	Wei-Ming Ni (Minnesota)	Jenn-Nan Wang, Chun-Hsiung Hsia
E1	NCTS Nano-course on Scientific Computing	2015/03/25	NCTS	Yuan-Sen Yang (NTUT)	Weichung Wang
E2	NCTS Nano-course on Scientific Computing	2015/06/01	NTU	Tsung-Ren Huang (NTU)	Tsung-Ren Huang
E3	NCTS Summer Course on Data Analysis and Statistics	2015/06/30-2015/07/01	NCTS	Hung-Chi Kuo (NTU), Shih-Hao Su (CCU)	Hung-Chi Kuo
E4	2015 NCTS Spring Course on MPI Parallel Computing	2015/03/06-2015/05/13	NCTS, NCU	Chieh-Sen Huang (NSYSU), Weichuang Wang (NTU)	Chieh-Sen Huang, Weichuang Wang
F1	NCTS Summer School: Analysis and Modeling of High Throughput DNA Methylation Data	2015/07/27-2015/08/06	CCU	Je-Chiang Tsai (NTNU), Michael Chan (CCU)	Je-Chiang Tsai, Michael Chan
F2	NCTS Summer School: Modeling, Simulation and Analysis of Nonlinear Optics	2015/09/04-2015/09/08	NCKU, NUK	Yung-fu Fang (NCKU) et al.	Yung-fu Fang, Tai-Chia Lin, Tsung-fang Wu
F3	2015 NCTS Summer Course on Numerical Weather Prediction	2015/08/12-2015/08/13	NCTS	Hung-Chi Kuo (NTU), Jing-Shan Hong (CWB)	Hung-Chi Kuo
F4	NCTS Summer School: Modeling, Simulation and Analysis of Electrolytes	2015/08/18-2015/09/02	NCTS	Tai-Chia Lin (NTU)	Tai-Chia Lin
F5	2015 NCTS Summer Course in Mathematical Biology	2015/09/03-2015/09/10	NTHU	Sze-Bi Hsu (NTHU), Je-Chiang Tsai (NTNU)	Sze-Bi Hsu, Je-Chiang Tsai
F6	NCTS Winter School Modeling, Simulation and Analysis of Biology and Physiology	2015/12/18-2015/12/31	NCTS	Tom Chou (UCLA), et al.	Tai-Chia Lin
G1	NCTS/NCU Short Course on Data Science	2015/05/05-2015/05/07	NCTS	Hau-Tieng Wu (Toronto), Yuan Yao (PKU)	I-Liang Chern

	Title	Dates	Venue	Speakers	Organizers
A1	NCTS Spring Course: Abelian Varieties and Related Topics	2016/02/15-2016/06/21	AS	Chia-Fu Yu (AS)	Chia-Fu Yu
A2	NCTS Spring Course: Representation Theory of Finite Groups of Lie type	2016/02/19-2016/06/24	AS	Chia-Fu Yu (AS)	Chia-Fu Yu
A3	AS-NCTS Special Lecture Series on Arithmetic Geometry	2016/03/02-2016/03/21	NCTS	Chia-Fu Yu (AS)	Chia-Fu Yu
A4	NCTS Summer School on Shimura Varieties and Related Topics	2016/05/23-2016/05/27	NCTS	Paul Hamacher (Munchen) et al.	Chia-Fu Yu
A5	NCTS Distinguished Lecture Series	2016/07/05-2016/07/07	NCTS	John Coates (Cambridge)	Minglun Hsieh
A6	NCTS Summer Short Course on Number Theory I/II	2016/08/02-2016/08/11	NTHU	Chieh-Yu Chang (NTHU), Fu-Tsun Wei (NCU)	Chang Chieh-Yu, Wei Fu-Tsun
B1	NCTS Minicourse in Algebraic Geometry-minimal log-discrepancy	2016/03/16-2016/03/23	NCTS	Masayuki Kawakita (RIMS)	Jungkai Chen
B2	NCTS Minicourse in Algebraic Geometry-Boundedness in Algebraic Geometry	2016/03/16-2016/03/25	NCTS	Paolo Cascini (Imperial College/NCTS)	Jungkai Chen
B3	NCTS Distinguished Scholar Lectures-Noncommutative Deformations	2016/03/18-2016/03/25	NCTS	Yujiro Kawamata (Tokyo/NCTS)	Jungkai Chen
B4	NCTS Minicourse in Algebraic Geometry-MMP for foliations	2016/04/06-2016/04/08	NCTS	Paolo Cascini (Imperial College/NCTS)	Jungkai Chen
B5	NCTS Summer Course on Elliptic Curve	2016/07/25-2016/08/12	NCTS	Yi-Fan Yang (NCTU), Wu-Yen Chuang (NTU), Chin-Yu Hsiao (AS)	Jungkai Chen
C1	NCTS Mini-course on Mirror Symmetry	2016/06/18-2016/06/20	NCTS	Kazushi Ueda (Tokyo)	River Chiang, Mao-Pei Tsui
C2	NCTS Summer Course on Aspects of Geometric Analysis	2016/07/04-2016/07/12	NCTS	Mu-Tao Wang (Columbia)	Mao-Pei Tsui
C3	Mini-course on Symplectic Fillings and More	2016/07/26-2016/07/28	NCTS	Jongil Park (Seoul), Cheuk-Yu Mak (Minnesota)	River Chiang, Chung-I Ho
C4	Summer Course on Fractional Sobolev Spaces in Geometric Knot Theory	2016/08/02-2016/08/05	NCTS	Simon Blatt (Salzburg)	Mao-Pei Tsui
C5	Sinica-NCTS Distinguished Lecture Series-Steklov Eigenvalues and Free Boundary Minimal Surfaces	2016/08/03-2016/08/03	NCTS	Richard Schoen (Stanford)	Mao-Pei Tsui
D1	Mathematical Theory for Kinetic Equations	2016/02/26-2016/06/24	NCKU	Kazuo Aoki (Kyoto), Tai-Ping Liu (AS), Jin-Cheng Jiang (NTHU)	Kung-Chien Wu
D2	NCTS Seminar in Quantum Random Walks	2016/03/11-2016/03/21	NCTS	Wei-Shih Yang (Temple)	Chih-Chung Chang, Yuan-Chung Sheu
D3	NCTS Probability summer courses	2016/07/25-2016/08/16	NCTS	Tzuu-Shuh Chaing (AS); Shuenn-Jyi Sheu (NCU)	Sheu Yuan-Chung
D4	NCTS Summer School on Dynamical Systems: Topological and arithmetic dynamics	2016/08/05-2016/09/16	NCTS	W. Abram (Hillsdale College) et al.	Jung-Chao Ban
E1	NCTS Short Courses on High-Performance Linear System Solvers	2016/02/23-2016/06/07	NCTS	Rio Yokota (TIT) et al.	Weichung Wang, Wen-Wei Lin, Tsung-Ming Huang
E2	Big Data Meeting	2016/03/24-2017/06/30	NCTS	Matthew M. Lin (CCU)	Weichung Wang
F1	NCTS mini course on Ginzburg-Landau equations and related topics	2016/04/15-2016/05/14	NCTS	Rejeb Hadiji (Paris-Est Creteil)	Tai-Chia Lin
F2	Summer Course on Mathematical Modeling and Analysis of Infectious Diseases	2016/07/04-2016/07/08	NCTS	Hiroshi Nishiura (Hokkaido), et. al.	Ying-Hen Hsieh, Lin Hsien-Ho

	Title	Dates	Venue	Speakers	Organizers
F3	NCTS Summer Course in Modeling for Stochastic Processes in Cell Biology	2016/07/14-2016/09/01	NCTS	Chao-Ping Hsu (AS), Dr. Ching-Cher Sanders Yan (AS)	Chao-Ping Hsu, Je-Chiang Tsai, Ching-Cher Yan
F4	NCTS Summer Course in Mathematical Biology	2016/08/01-2016/08/26	NTHU	Feng-Bin Wang (Chang Gung Univ) et al.	Sze-Bi Hsu, Je-Chiang Tsai, Feng-Bin Wang
F5	Short Course in Optimization: Theory and Mathematical Models I	2016/08/15-2016/08/19	NCTS	Ruey-Lin Sheu (NCKU)	Ruey-Lin Sheu, Jein-Shan Chen
H1	NCTS Mini-course on Analysis at NSYSU	2016/04/07-2016/05/26	NSYSU	Denny Leung (SNU)	Ngai-Ching Wong
H2	NCTS Mini-course on Harmonic Analysis	2016/03/14-2016/03/28	NCU	Yongcsheng Han	Chin-Cheng Lin

	Title	Dates	Venue	Speakers	Organizers
A1	2017 NCTS Spring Course: Topics on Abelian Varieties and Shimura Varieties	2017/02/14-2017/06/13	NCTS	Chia-Fu Yu (AS)	Chia-Fu Yu
A2	Mini/course on Representation Theory	2017/07/10-2017/07/13	NCTS	Yung-Ning Peng (NCU), Chih-Whi Chen (NCTS)	Yung-Ning Peng, Chih-Whi Chen
B1	2017 Winter School in Algebraic Geometry	2017/02/07-2017/02/10	NCTS	Jiun-Cheng Chen (NTHU)	Jungkai Chen
B2	An Introduction to Equivariant Cohomology	2017/02/20-2017/05/01	NCTS	Loring Tu (Tufts)	Jungkai Chen
B3	Mini-course on Perfectoid Spaces	2017/07/06-2017/07/12	NCTS	Paolo Cascini (Imperial)	Jungkai Chen
C1	NCTS Course: Frobenius Manifolds For Everbody	2017/03/31-2017/04/01	NCTS	Martin Guest (Waseda)	Nan-Kuo Ho, Mao-Pei Tsui
C2	2017 NCTS Mini-Course and Workshop on Ricci Flow and Related Aspects	2017/05/31-2017/06/09	NCTS	Jacob Bernstein (JHU) et al.	Mao-Pei Tsui, Huai-Dong Cao, Shu-Cheng Chang, Jiaping Wang
C3	NCTS Summer Course on Introduction to Knot Theory	2017/07/10-2017/07/21	NCTS	Jih-Hsin Cheng (AS), Michael Tsau (SLU), Mao-Pei Tsui (NTU)	Jih-Hsin Cheng, Mao-Pei Tsui
D1	NCTS Short Course on Landau Kinetic Equation	2017/01/10-2017/01/12	NCKU	Yu-Chu Lin (NCKU), Haitao Wang (AS)	Kung-Chien Wu
D2	A Comprehensive Survey of Diffusion Maps	2017/02/06-2017/02/07	NCTS	Gi-Ren Liu (NCKU)	Jenn-Nan Wang
D3	NCTS Summer School on Dynamical Systems: Symbolic Dynamics	2017/07/21-2017/08/11	NCTS	Wen-Guei Hu (NCTU), Chih-Hung Chang (NCU)	Jung-Chao Ban
D4	2017 NCTS Summer Courses on Introduction to Brownian Motion and Partial Differential Equations	2017/08/07-2017/08/16	NCTS	Tzuu-Shuh Chiang (AS), Shuenn-Jyi Sheu (NCU), Wei-Da Chen (NTU),	Lung-Chi Chen
D5	NCTS Summer Course on Mathematics and Technology	2017/09/04-2017/09/07	NCTS	Chun-Kong Law (NSYSU), Tsung-Lin Lee (NSYSU)	Chun-Hsiung Hsia
E1	Introduction to Parallel Programming for Multicore/Manycore Clusters	2017/02/21-2017/02/24	NCTS	Kengo Nakajima (Tokyo), Tetsuya Hoshino (Tokyo)	Weichung Wang
E2	NCTS 2017 Courses on High Performance Computing and Deep Learning	2017/03/23-2017/04/27	NCTS	Ting-Li Chen (AS) et al.	Weichung Wang
E3	NCTS Course on Low Rank Matrix Completion and its Application in Image Processing, Machine Learning, etc.	2017/03/27	NCTS	Jian-Feng Cai (HKUST)	I-Liang Chern
E4	Short Course on Parareal Method for Time-Dependent Problems	2017/06/08	NCTS	Yen-Hsi Richard Tsai (UT, Austin)	I-Liang Chern
E5	Scientific Computing on Supercomputer	2017/06/26-2017/07/07	NCTS	Kengo Nakajima (Tokyo) et al	Weichung Wang et al

	Title	Dates	Venue	Speakers	Organizers
F1	NCTS Short Course of Mathematical Physiology	2017/03/10-2017/03/24	NCTS	Marc Thiriet (Paris VI)	Tai-Chia Lin
F2	NCTS Short Course on Applied Mathematics	2017/06/26-2017/06/27	NCTS	Maria Pia Gualdani (George Washington Univ.)	I-Liang Chern
F3	Summer Course on Modeling and Analysis of Infectious Diseases	2017/07/10-2017/07/21	NCTS	Nimalan Arinaminpathy (Imperial College London) et al.	Tai-Chia Lin, Ying-Hen Hsieh, Hsien-Ho Lin
F4	2017 NCTS Summer Course in Mathematical Biology	2017/08/03-2017/08/16	NTHU	Xing Liang (Univ. Sci. and Tech. of China) et al.	Sze-Bi Hsu , Je-Chiang Tsai , Feng-Bin Wang
H1	NCTS Mini-Course in Analysis: Littlewood-Paley Theory and Hardy Spaces	2017/03/20-2017/03/30	NCTS	Yongsheng Han (Auburn)	Chin-Cheng Lin
H2	NCTS Summer Course on Additive Combinatorics	2017/06/26-2017/07/05	NCTS	Chun-Yen Shen (NCU)	Chun-Yen Shen
H3	NCTS Summer Course on Free Probability	2017/06/26-2017/07/05	NCTS	Jiun-Chau Wang (Saskatchewan)?	Chun-Yen Shen
H4	NCTS Summer Course on Brownian Motion	2017/07/14-2017/08/18	NCTS	Fang Xiang (NCU)	Xiang Fang, Lin Chin-Cheng Lin

11.3 List of Conference and Workshops

	Event	Date	Venue	Organizers	Countries
A1	NCTS Mini-workshop on Special Values in Positive Characteristic	2015/05/27	NTHU	Chieh-Yu Chang (NTHU)	Taiwan
B1	2015 NCTS Winter School in Algebraic Geometry	2015/02/09-2015/02/11	NCTS	Jungkai Chen (NTU) Jiun-Cheng Chen (NTHU) Chen-Yu Chi (NTU) Shin-Yao Jow (NTHU)	Taiwan
B2	Mini-Conference on Algebraic	2015/03/06	NCTS	Jiun-Cheng Chen (NTU) Wu-yen Chuang (NTU) Katsuhisa Furukawa (NTU)	Taiwan,Japan
B3	Higher Dimensional Algebraic Geometry	2015/08/19-2015/08/23	NCTS	Jiun-Cheng Chen (NTU & NCTS) Yujiro Kawamata (University of Tokyo& NCTS)	Taiwan
C1	The 10th Taiwan Geometry Symposium	2015/05/02	NCKU	Yng-Ing Lee (NTU) et al.	Taiwan, Japan
C2	NCTS 2015 Special Day on Symplectic Geometry and Geometric Evolution Equations	2015/06/22	NCTS	Mao-Pei Tsui (NTU)	Taiwan
C3	2015 NCTS Workshop on Subelliptic Operators and Singular Analysis	2015/06/24-2015/06/25	NCTS	Der-Chen Chang (Georgetown), Shu-Cheng Chang (NTU), Mao-Pei Tsui (NTU)	Taiwan
D1	2015 Analysis and PDE Young Scholars Symposium	2015/02/05	NCTS	Jenn-Nan Wang (NTU)	Taiwan
D2	2015 NCTS Workshop on Applied Mathematics	2015/03/05	TKU	Jong-Shenq Guo (TKU)	Taiwan
D3	2015 NCTS Workshop on Dynamical Systems	2015/05/21-2015/05/23	NCTS	Jung-Chao Ban (NDHU) et al.	Taiwan, USA, Japan
D4	NCTS Workshop on Reaction-Diffusion Equations and Related Topics	2015/06/04-2015/06/05	NTHU	Chiun-Chuan Chen (NTU) Chao-Nien Chen (NTHU)	Taiwan
D3	NCTS 2015 Analysis and PDE Young Scholars Summer Symposium	2015/06/23	NUK	Jenn-Nan Wang (NTU) Tsung-Fang Wu (NUK)	Taiwan
D4	NCTS Distinguished Lecture Series	2015/10/02-2015/10/04	NCTS	Jenn-Nan Wang (NTU)	Taiwan, USA, China, Korea, Vietnam
D5	NCTS Workshop	2015/11/12	NCTS	Jenn-Nan Wang (NTU)	Taiwan, Japan
E1	NCTS / NCU One-Day Workshop on Multiscaling Computational Methods and Compressive Sensing	2015/06/25	NCTS	I-Liang Chern (NTU)	Taiwan, Japan, U.S.A.
F1	One Day Workshop on Nonlinear Analysis, Combinatorial Analysis, and Matrix Analysis	2015/01/14	NCTS	Jein-Shan Chen (NTNU)	Taiwan
F2	2015 NCTS Workshop on Applied Mathematics at Tainan	2015/06/15	NCTS	Chang-Hong Wu (NUT)	Taiwan, Japan, USA
F3	NCTS 2015 Spring Workshop on Fluid Dynamics	2015/06/12-2015/06/13	NCTS	Ching-hsiao Cheng (NCU), Chun-Hsiung Hsia (NTU)	Taiwan
F4	NCTS 2015 International Workshop on Development and Application of Empirical Dynamic Modeling and Forecasting for Nonlinear Systems	2015/09/16-2015/09/18	NCTS	Chih-hao Hsieh (NTU) Hung Chi Kuo (NTU)	Taiwan, USA, Germany, Japan, France, Australia, Netherlands
F5	One Day Workshop on Optimization	2015/10/14	NCTS	Jein-Shan Chen (NTU)	Taiwan
G1	Toward Big Data Analysis Workshop	2015/06/05-2015/06/06	NSYU	Mei-Hui Guo (NSYSU)	Taiwan
Z1	2015 East Asian Core Doctorial Forum on Mathematics	2015/01/19-2015/01/22	NCTS	Jungkai Chen (NTU) Yng-Ing Lee (NTU)	Taiwan, Japan, Korea, China

	Event	Date	Venue	Organizers	Countries
A1	Workshop on Finite Groups, VOA and Algebraic Combinatorics	2016/03/21-2016/03/25	FGU	Ching-Hung Lam (AS)	Taiwan, Japan
A2	2016 AS-NCTS Workshop on Shimura Varieties and Related Topics	2016/05/30-2016/06/03	AS	Chia-Fu Yu (AS), Xuhua He (Maryland), Kai-Wen Lan (Minnesota)	China, Korea, Hong Kong, Taiwan, Romania, Vitnamn, USA
A3	Conference in Finite Groups and Vertex Algebras	2016/08/22-2016/08/26	AS	Ching-Hung Lam (AS), Dong Chong-Ying (UC, Santa Cruz), Richard Lyons (Rutgers), Alex Ryba (CUNY)	Taiwan, USA
A4	Japan-Taiwan Joint Conference on Number theory 2016	2016/09/08-2016/09/13	NCTS	Ming-Lun Hsieh(AS)	Taiwan, USA
B1	Younger Generation in Algebraic Geometry and Complex Geometry	2016/01/11-2016/01/15	NCTS	Wu-yen Chuang (NTU), Yoshinori Gongyo (Tokyo) et al.	Taiwan, Japan
B2	NCTS Workshop in Algebraic Geometry at CCU	2016/03/29	CCU	Jungkai Chen (NTU)	Taiwan, Japan, China
B3	NCTS AG Day	2016/10/14	NCTS	Jungkai Chen (NTU)	Taiwan, Japan, China
B4	NCTS AG Day	2016/11/11	NCKU	Jungkai Chen (NTU)	Taiwan, Japan, China
B5	One Day workshop in Algebraic Geometry	2016/12/16	NCTS	Jungkai Chen (NTU)	Taiwan, Japan, China
C1	2016 The third Taiwan International Conference on Geometry	2016/01/18-2016/01/22	NCTS	Yng-Ing Lee (NTU), Sun-Yung Alice Chang (Princeton)	China, USA, Japan, Taiwn, German, France
C2	The 12th Taiwan Geometry Symposium	2016/05/14	NTHU	Mao-Pei Tsui (NTU), Yng-Ing Lee (NTU), Nan-Kuo Ho (NTHU), River Chiang (NCKU)	Taiwan, Japan
C3	NCTS International Workshop on Geometric Analysis and Subelliptic PDEs	2016/05/24-2016/05/26	NCTS	Der-Chen Chang (Georgetown), Shu-Cheng Chang (NTU), Mao-Pei Tsui (NTU)	Taiwan, USA, Norway, Germany, Japan, China
C4	NCTS One Day Workshop on Symplectic and Poisson Geometry	2016/06/08	NTHU	Nan-Kuo Ho (NTHU), Mao-Pei Tsui (NTU)	Taiwan, USA, Hong Kong
C5	NCTS Special Day on Isometric Embeddings	2016/07/15	NCTS	Mao-Pei Tsui (NTU)	Taiwan
D1	2016 NCTS Young Dynamics Day	2016/02/19	NCTS	Jung-Chao Ban (NDHU), Kuo-Chang Chen (NTHU), Cheng-Hsiung Hsu (NCU)	Taiwan
D2	Workshop on Recent Development in Reaction-Diffusion Equations	2016/02/26	NCTS	Chiun-Chuan Chen (NTU), Masayasu Mimura (Meiji) et al.	Taiwan, Japan
D3	The 7th Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics	2016/02/27-2016/02/29	NCKU	Chiun-Chuan Chen (NTU), Jann-Long Chern (NCU), Yung-fu Fang (NCKU), Jong-Shenq Guo (TKU)	Taiwan, Japan
D4	Spring Probability Workshop in 2016	2016/03/07-2016/03/09	AS	Guan-Yu Chen (NCTU)	China, Japan, Korea, Taiwan

	Event	Date	Venue	Organizers	Countries
D5	2016 NCTS Workshop on Applied Mathematics at Tainan	2016/03/28	NUT	Chang-Hong Wu (NUT) et al.	Taiwan, Japan
D6	2016 NCTS Workshop on Dynamical Systems	2016/08/15-2016/08/18	NCTS	Jung-Chao Ban (NDHU), Ai-Hua Fan (Picardie) et al.	Taiwan, France, China, Hong Kong
D7	2nd East Asia Section of IPIA-Young Scholars Symposium	2016/11/05-2016/11/06	NCTS	Jenn-Nan Wang (NTU)	Taiwan, China, Korea, Japan
D8	NCTS Workshop on Nonlinear Differential Equations: Theory and Application	2016/11/18-2016/11/19	NCTS	Jenn-Nan Wang (NTU) et al.	Taiwan,Japan
E1	Water Waves: Theory, Simulations & Experiments, A Communication Between Mathematics & Engineering	2016/03/13	NCTS	Chun-Hsiung Hsia (NTU), Juan-Ming Yuan (PU), I-Liang Chern (NTU)	Taiwan, USA
E2	2016 NCTS Workshop on Computational Mathematics for Young Researchers	2016/03/18-2016/03/19	NCTU	Suh-Yuh Yang (NCU), Wen-Wei Lin (NCTU) et al.	Taiwan
E3	NCTS workshop on Compressive Sensing + Signal Processing	2016/03/25	NCTS	I-Liang Chern (NTU)	Taiwan
E4	NCTS workshop on Compressive Sensing + Signal Processing	2016/04/15	NCTS	I-Liang Chern (NTU)	Taiwan
E5	NCTS Workshop on Compressive Sensing + Brain Science through MRI	2016/04/22	NCTS	Chern I-Liang (NTU)	Taiwan
E6	NCTS workshop on Compressive Sensing + Data Science	2016/05/27	NCTS	I-Liang Chern (NTU)	Taiwan
E7	Workshop on Recent Development of Matrix Computations	2016/05/13	NCTS	Tsung-Ming Huang (NTNU), Wen-Wei Lin (NCTU), Weichung Wang (NTU)	Taiwan
F1	2016 NCTS International Workshop in Mathematical Biology	2016/05/21-2016/05/23	NTHU	Hsu Sze-Bi (NTHU), et al.	Taiwan,USA, Hong Kong,China,Canada
F2	2016 Summer Course on Mathematical Modeling and Analysis of Infectious Diseases	2016/07/04-2016/07/08	NCTS	Ying-Hen Hsieh (China Medical Univ.), Hsien-Ho Lin (NTU)	Taiwan, USA, Hong Kong, China
F3	2016 Optimization Workshop	2016/02/26	NTNU	Ruey-Lin Sheu (NCKU), Jein-Shan Chen (NTNU)	Taiwan
G1	Big and Small Data in Statistical Quality Control and Reliability Analysis	2016/05/20	NCKU	Shuen-Lin Jeng (NCKU), Ray-Bing Chen (NCKU)	Taiwan
G2	Big Data Learning for Prediction	2016/06/30	NCTS	Wei-Chung Wang (NTU)	Taiwan
H1	NCTS One-day Workshop on Analysis	2016/02/16	NCTS	Chin-Cheng Lin (NCU)	Taiwan
H2	2016 Analysis Young Scholars Symposium	2016/05/06	NCU	Chin-Cheng Lin (NCU) Ming-Yi Lee (NCU)	Taiwan
Z1	NCTS 2016 Spring Day	2016/03/27	NCTS	Jungkai Chen (NTU)	China, France, Korea, Hong Kong, Taiwan, Romania, Vitnamn, USA

	Event	Date	Venue	Organizers	Countries
A1	2017 Taipei Workshop on Representation Theory of Lie Superalgebras and Related Topics	2017/07/03-2017/07/07	NCTS	Chih-Whi Chen (NCTS), Shun-Jen Cheng (AS), Yung-Ning Peng (NCU)	USA, Australia, Isreal, UK, Japan, Korea, Germany, China, Japan, Taiwan
A2	Workshop on P-Adic L-Functions and Algebraic Cycles	2017/09/11-2017/09/15	NCTS	Ming-Lun Hsieh (AS)	Italy, Japan, Korea, USA, Germany, Taiwan
B1	NCTS Algebraic Geometry Day, III	2017/03/18-2017/03/18	SMLTH	Jungkai Chen (NTU)	China, Japan, Taiwan
B2	NCTS Workshop on Singularities, Linear Systems, and Fano Varieties	2017/04/13-2017/04/16	NCTS	Jungkai Chen (NTU), Birkar Caucher (Cambridge) Yujiro Kawamata (Tokyo)	Romania, UK, China, Japan, China, Taiwan
B3	NCTS Algebraic Geometry Day,IV	2017/05/19-2017/05/19	NTHU	Jungkai Chen (NTU), Jiun-Cheng Chen (NTHU), Shin-Yao Jow (NTHU)	China, Japan, Taiwan
B4	NCTS Workshop in Higher Dimensional Algebraic Geometry	2017/06/19-2017/06/23	NCTS	Jungkai Chen(NTU), Yujiro Kawamata (Tokyo)	USA, UK, China, Japan, Russia, Poland, Korea, Japan, Singapore, Taiwan
C1	2017 NCTS Mini-Workshop on Geometric Analysis	2017/01/05-2017/01/05	NCTS	Mao-Pei Tsui (NTU), Schoen Richard (Stanford)	China, Japan, USA, Taiwan
C2	The Fourteenth Taiwan Geometry Symposium	2017/04/15-2017/04/15	NCTS	Mao-Pei Tsui (NTU), Yng-Ing Lee (NTU), Nan-Kuo Ho (NTHU), Chiang River (NCKU)	Japan, USA, China, Taiwan
C3	International Workshop on Harmonic Analysis and Geometric Analysis	2017/05/23-2017/05/25	NCTS	Der-Chen Chang (Georgetown), Chun-Yen Shen (NCU)	China, Japan, USA, Norway, Germany, Taiwan
C4	2017 NCTS Mini-Course and Workshop on Ricci Flow and Related Aspects	2017/06/12-2017/06/16	NCTS	Mao-Pei Tsui (NTU), Huai-Dong Cao (Lehigh), Shu-Cheng Chang (NTU), Jiaping Wang (Minnesota)	USA, China, Taiwan, Germany, Brazil
D1	2017 NCTS Young Dynamics Day	2017/02/10-2017/02/10	NTNU	Jung-Chao Ban (NDHU) et al	Japan, China, Taiwan
D2	2017 NCTS Workshop on Applied Mathematics at Tainan	2017/03/06-2017/03/06	NUT	Chang-Hong Wu (NUT) et al.	Japan, China, Taiwan
D3	2017 Spring Probability Workshop	2017/03/06-2017/03/08	AS	Lung-Chi Chen (NCCU) et al.	USA, Korea, Japan, China, Taiwan
D4	Workshop on Applied Analysis and Probability	2017/03/24-2017/03/24	NCTS	Jenn-Nan Wang (NTU), Narn-Rueih Shieh (NTU)	Romania, UK, China, Japan, Korea, India, Taiwan
D5	2017 NCTS Workshop on Dynamical Systems	2017/05/25-2017/05/27	NCTS	Jung-Chao Ban (NDHU) et al.	USA, Japan, China, Taiwan
D6	Workshop on Inverse Problems and Related Subjects	2017/05/27-2017/05/27	NCTS	Jenn-Nan Wang (NTU)	Romania, UK, China, Japan, Korea, India, Taiwan
D7	2017 NCTS Workshop on Partial Differential Equations	2017/06/28-2017/06/28	NTHU	Chao-Nien Chen (NTHU)	USA, Italy, Japan, Taiwan
D8	ReaDiNet 2017: International Conference on Mathematical Biology	2017/10/12-2017/10/14	NCTS	Chiun-Chuan Chen (NTU), Jong-Shenq Guo (TKU)	France, Japan, Korea, USA, Taiwan
D9	International Conference on Nonlinear Analysis: Kinetic Theory, Gas Dynamics, and Related Fields	2017/10/28-2017/10/31	AS	Kazuo Aoki (NCTS/NCKU), Kung-Chien Wu (NCKU) et al.	Russia, Germany, France, Italy, Sweden, USA, Taiwan

	Event	Date	Venue	Organizers	Countries
E1	NCTS Student Workshop on Data Science	2017/01/12-2017/01/12	NTU	Weichung Wang (NTU)	Taiwan
E2	2017 Conference on Advanced Topics and Auto Tuning in High-Performance Scientific Computing (ATAT 17)	2017/03/10-2017/03/11	NCTS	Weichung Wang (NTU), Takahiro Katagiri (Nagoya), Reiji Suda (Tokyo)	Taiwan,Japan
E3	NCTS Workshop on Applied Mathematics	2017/03/15-2017/03/15	NCTS	I-Liang Chern(NTU)	USA, Taiwan
F1	Workshop on Mathematical Modeling and Simulation of Electrolytes with Application to Molecular Physiology	2017/01/10-2017/01/11	NCTS	Tai-Chia Lin (NTU)	Japan, USA, Taiwan
G1	Bayesian Data Analysis and Computation	2017/03/17-2017/03/17	NCKU	Ray-Bing Chen (NCKU), Sheng-Mao Chang (NCKU), Kuo-Jung Lee (NCKU)	USA, Japan, Taiwan
Z1	NCTS 2017 Spring Day	2017/03/04-2017/03/04	NCTS	Jungkai Chen (NTU)	Romania, USA, Korea, Vietnam, India, Lebanon, Japan, China, Taiwan

11.4 List of Seminars

11.4.1 List of 2015 Seminars

Title	Dates	Gp.	Venue
NCTS Number Theory Seminar	3/25, 4/15, 5/13, 6/1, 9/16, 9/23, 9/30, 11/18, 11/25, 12/22, 12/23	A	NTHU
NCTS Seminar on Arithmetic Geometry and Representation Theory	8/3, 8/5, 8/12, 8/19, 8/26, 9/17, 9/24, 10/1, 10/8, 10/15, 11/4, 11/12, 11/19, 11/26	A	NCTS
NCTS Seminar on Motivic Cohomology	12/23,12/29	A	NCTS
NCTS Reading Seminar in Algebraic Geometry	1/15 ,1/22, 1/29, 4/30, 5/28, 6/9, 7/9, 9/3	B	NCTS
NCTS Seminar in Algebraic Geometry	4/10, 4/24, 6/5, 6/12, 6/26, 7/3, 7/10, 8/7, 9/25, 10/2, 10/16, 10/23, 10/30, 11/6, 11/13, 11/20, 11/27, 12/31	B	NCTS
NCTS Algebraic Geometry Seminar at NCKU	3/26, 4/9, 5/14, 5/28, 6/4, 6/18, 7/23, 7/30, 8/6, 9/3, 9/15, 9/22, 10/27, 11/3, 11/17, 11/27, 12/15	B	NCKU
Learning Seminar in Algebraic Geometry	6/9,	B	NCTS
Topics in Algebraic Geometry	3/30, 4/13, 4/20, 4/27, 5/4, 5/11, 5/25, 6/1, 6/15	B	NTHU
NCTS Differential Geometry Seminar	1/7, 1/15, 3/5, 3/17, 3/18, 3/19, 3/19, 4/9, 4/16, 4/23, 4/30, 5/21, 5/28, 6/11, 9/20, 9/25, 10/1, 10/8, 10/16, 10/29, 11/6, 11/19, 11/30, 12/21, 12/24	C	NCTS
NCTS Geometric Analysis Seminar	12/7, 12/8	C	NCTS
Sinica-NCTS Geometry Seminar	4/27, 5/18, 5/29, 7/22, 9/4, 10/16, 10/23 ,12/14, 12/18	C	NCTS
NCTS/NTHU Joint Geometry and Topology Seminar	3/25, 4/1, 4/15, 4/22, 10/14, 10/28, 11/25, 12/9, 12/30	C	NTHU
Sinica-NCTS Reading Seminar on Geometry	1/20	C	NCTS
NCTS Differential Geometry Seminar-Series of Talks on Willmore-type functional	3/17, 3/18, 3/19	C	NCTS
NCTS Learning Seminar on Special Holonomy	10/1	C	NCTS
NCTS Seminar on Stochastic PDEs	7/6	D	NCTS
2015 NCTS & NCU Seminar on Stochastic PDEs	10/23, 10/30	D	NCU
IAMS/NCTS Applied Math Seminar	1/9, 3/4, 3/9, 3/18, 3/27, 5/27, 12/30, 12/31	D	NCTS
NCTS Probability Seminar at NCCU	3/20, 4/17, 5/1, 5/15, 5/22	D	NCCU
NCTS Symbolic Dynamics Seminar	3/27, 4/10, 4/24, 5/15, 6/5, 6/12, 6/26	D	NCTS
NCTS Seminar in Dynamical Systems	11/20, 11/27, 12/4, 12/11, 12/18, 12/25	D	NCTS
IAMS/NCTS/NCU Fluid PDE Seminar	1/9, 3/6, 3/6, 3/13, 3/13, 3/20, 3/20, 4/10, 4/10, 4/24, 4/24, 5/1, 5/1, 5/29, 5/29	D	NCTS
NCTS Arithmetic Dynamics Seminar	4/10, 4/24, 5/15, 5/29, 6/5, 6/12, 6/26	D	NCTS
NCTS PDE & Analysis Seminar	4/20, 5/7, 5/14, 6/11, 6/25, 7/16, 8/20, 9/24, 10/1, 10/15, 10/22, 10/29, 11/9, 11/12, 11/19, 11/23, 11/26, 12/3, 12/23, 12/24	D	NCTS/ NTHU
NCTS PDE Seminar	4/24, 4/28, 7/2, 7/9, 7/22, 8/12, 9/9, 9/16, 10/22, 10/23, 10/30, 11/12, 11/19, 12/10, 12/17, 12/24	D	NCTS et al
NCTS/CMMSC Seminar on Probability Theory and Related Topics	5/27,	D	NCTS
NCTS Applied Mathematics Seminar	10/15, 11/16	D	NCTS
NCTS/CMMSC Seminar on Probability and Statistics with Applications	5/14, 6/1, 6/18, 6/18, 6/29, 6/30, 7/6, 11/17	D	NCTU
NCTS/CMMSC Seminar on Scientific Computing	3/18, 3/27, 4/17, 4/17, 4/24, 4/30, 5/29, 6/17	E	NCTU
NCTS/NTU/NCU/NTUST Joint Seminar on Compressive Sensing and Its Applications	10/16, 10/23, 11/20, 11/27, 12/4, 12/18, 12/25	E	NCTS
NCTS Seminar on Scientific Computing for Data Science	10/23,	E	NCTS
NCTS Weekly Seminar in Mathematical Modeling	4/25, 4/30, 5/1, 5/1, 5/18, 5/23, 5/21, 6/11, 7/15, 7/21, 9/29, 10/6	F	NCTS/ NCHU/ CCU

Title	Dates	Gp.	Venue
NCTS Mathematical Biology Seminar	4/24, 5/8, 5/15	F	NTHU
NCTS Seminar on Signals of ion channels	8/20,	F	NCTS
NCTS Interdisciplinary Talks	9/4, 9/4, 9/8, 9/8, 9/24	F	NCKU
NCTS Interdisciplinary Talks in Mathematical Biology	10/16, 10/23, 12/4	F	NTHU
NCTS/NTHU Seminar in Mathematical Biology	11/13, 11/20, 11/27	F	NTHU
NCTS /IAMS/ NTUST Data Science Seminar	5/1, 5/8, 5/19	G	NCTS
Big Data Seminar	4/8,	G	NCTS
NCTS Seminar on Harmonic Analysis	11/5, 11/12, 11/19, 11/26, 12/3, 12/24, 12/31	H	NCU
NCTS Optimization Seminar	1/5,	H	NTNU

11.4.2 List of 2016 Seminars

Title	Dates	Gp.	Venue
NCTS Number Theory Seminar at Hsinchu	4/13, 4/27, 6/1, 6/15, 9/1	A	NTHU
NCTS Seminar on Arithmetic Geometry	2/15, 2/18, 2/25, 3/3	A	NCTS
NCTS Seminar on Arithmetic Geometry and Representation Theory	3/17, 3/24	A	NCTS
NCTS Seminar on Number Theory	2/22, 2/23, 2/24, 3/17, 3/18, 7/8, 12/21	A	NCTS
NCTS seminar of Algebra	8/31,	A	NCTS
NCTS Seminar in Algebraic Geometry	3/4, 4/15, 4/22, 4/29, 5/6, 5/13, 5/20, 5/27, 6/3, 6/17, 7/1, 7/25, 9/23, 9/30, 10/7, 10/21, 10/28, 11/4, 11/25, 12/9, 12/23, 12/26, 12/30	B	NCTS
NCTS Seminar of Cryptography	6/14, 6/15, 6/17	B	NCTS
NCTS Algebraic Geometry Seminar at NCKU	3/22, 4/19, 5/3, 5/17, 5/31, 7/5, 7/12, 7/19, 7/20, 7/26, 8/2, /17, 8/29, 9/26	B	NCKU
NCTS-Student Seminar on Algebraic Geometry	12/15, 12/19, 12/22, 12/26, 12/29	B	NCTS
NCTS Differential Geometry Seminar	2/18, 3/3, 3/10, 3/17, 3/24, 3/31, 4/14, 4/25, 4/28, 5/12, 5/26, 6/2, 6/16, 6/23, 7/21, 8/2, 8/24, 9/27, 10/4, 10/11, 10/14, 10/17, 10/18, 10/24, 10/31, 11/7, 11/8, 11/14, 11/21, 12/2, 12/5, 12/19	C	NCTS
Sinica-NCTS Geometry Seminar	4/8, 4/11, 8/26, 9/2, 9/9	C	NCTS
NCU-Sinica-NCTS Geometry Seminar	9/30,	C	NCU
Sinica-NCTS Seminar on Geometry and Several Complex Variables	4/15,	C	NCTS
NCTS Seminar of Topology	6/21,	C	NCTS
2016 NCTS/NCU Probability Seminar	6/3,	D	NCU
2016 NCTS/NCU Stochastic Seminar	6/3,	D	NCU
NCTS/CMMSC Seminar on PDEs	3/9, 3/16, 4/15, 4/22, 4/29, 5/13, 5/20	D	NCTU
NCTS & NCU PDE Seminar	1/6, 1/22, 5/13, 5/27, 6/3, 9/2	D	NCU
NCTS & NUK Seminar on Dynamical Systems	4/22, 5/13, 5/27	D	NUK
NCTS/CMMSC Seminar on Probability and Statistics	1/7,	D	NCTU
NCTS Seminar on Probability with Applications	10/7,	D	NCTU
NCTS and NCUE PDE Seminar	3/31, 4/21, 4/28, 5/5, 5/26	D	NCUE
NCTS PDE seminar at NCKU	6/2, 6/3	D	NCKU
NCTS Probability Seminar at NCCU	3/28, 4/25, 5/9, 5/23,6/6	D	NCCU
NCTS Distinguished Lecture	12/19, 12/26, 12/30	D	NCTS
NCTS Seminar on Dynamical Systems	1/12, 10/14, 10/21, 10/28, 11/4, 11/11, 11/18, 12/2	D	NUK
NCTS Seminar in Quantum Random Walks	3/12, 3/14, 3/21	D	NCTS
NCTS/Academia Sinica Joint Seminar on Probability Theory and Related Topics	7/4, 7/11	D	NCTS
Seminar on Inverse Problems	4/15, 5/20	D	NCTS
NCTS Seminar on PDE and Analysis	1/7, 1/26, 3/24, 4/14, 4/28, 5/2, 5/5, 5/12, 5/19, 8/19, 9/8, 9/22, 10/5, 10/20, 10/31, 12/22, 12/29	D, F	NCTS
NCTS / NTU / NCU / NTUST Joint Seminar on Compressive Sensing and Its Applications	1/8,1/15	E	NCTS
NCTS Seminar on Compressive Sensing + Signal Processing	4/15	E	NCTS
NCTS Seminar on High Frequency Approximations	6/13, 6/14	E	NCTS
NCTS/NCU Seminar on Scientific Computing	9/12, 9/19, 10/3, 10/17, 11/7, 11/14, 12/12, 12/19	E	NCU
NCTS Seminar on Applied Mathematics	3/4, 4/15, 5/16, 5/24	E, F	NCTS
NTHU-NCTS Seminar on Mathematical Biology	1/8, 3/16, 5/11, 5/20, 5/24, 6/3, 6/17, 8/9, 10/7	F	NTHU
NCTS Interdisciplinary Research Seminar	3/11	F	NCTS
NCTS Mathematical Modeling Seminar	3/9, 3/10, 6/13	F	NCTS
NCTS Seminar on Nonlinear Schrodinger Equations	7/14	F	NCTS

Title	Dates	Gp.	Venue
NCTS/NCU Harmonic Analysis Seminar	3/25, 9/22, 9/27, 9/29	H	NCU
NCTS Learning Seminar in Singular Integral Operators	3/8, 3/15, 3/22, 3/29	H	NCU
NCTS Seminar on Harmonic Analysis	1/7, 1/14	H	NCU
NCTS Seminar on Rings and Algebras	10/21, 10/28	I	NCTS
Sinica-NCTS Geometry Seminar	9/2, 9/9	I	NCTS
NCTS Forum in Data Sciences	3/24, 4/21, 5/19, 6/8, 7/21, 8/25, 9/22, 10/27, 11/22	L	NCTS
NCTS Seminar on Data Sciences	7/28	L	NCTS
Taipei Postdoc Seminar	9/14, 9/21, 9/27, 10/5, 10/12, 10/19, 10/26, 11/2, 11/9, 11/16, 11/23, 12/7, 12/14, 12/21	All	AS

11.4.3 List of 2017 Seminars

Title	Dates	Gp.	Venue
NCTS Number Theory Seminar	3/22, 4/19	A	NTHU
NCTS Seminar on Arithmetic Geometry and Representation Theory	2/17, 2/22, 2/23, 3/3, 3/10, 4/7, 4/14, 4/21, 4/28, 5/5, 5/26, 6/2, 6/9	A	NCTS
NCTS Seminar on Rings and Algebras	3/31, 4/28	A	NCTS
NCTS Seminar in Algebraic Geometry	1/6, 3/13, 3/20, 3/22, 3/27, 4/10, 5/22, 6/16, 6/21	B	NCTS/NCKU
NCTS Seminar on Geometry-Physics-Symmetry	6/9	B	NCTS
Sinica-NCTS Special Day on Several Complex Variables	6/2	C	NCTS
NCTS/NTHU Joint Geometry and Topology Seminar	5/24	C	NTHU
NCTS Differential Geometry Seminar	1/6, 1/13, 3/7, 3/10, 3/21, 3/31, 4/11, 4/25, 5/5, 5/16	C	NCTS/NTHU
Sinica-NCTS Geometry Seminar	2/17, 4/28, 6/16	C	NCTS
Sinica-NCTS Seminar on Geometry and Several Complex Variables	1/20	C	NCTS
Seminar on Probability and Related Topics	5/25	D	NCTU
NCTS Seminar on Dynamical Systems	3/24, 4/7, 4/21, 4/28, 5/5, 5/12, 5/19, 6/16, 6/23	D	NCTS
NCTS Probability Seminar	3/20, 3/27, 4/24, 5/22	D	NCCU
NCTS Reading Seminar on Kinetic Theory	2/20, 3/2, 3/13, 3/27, 4/13, 5/4, 5/18, 6/8	D	NCKU
NCTS PDE & Analysis Seminar	1/5, 1/6, 1/16,3/2,3/9, 5/4,6/1	D	NCTS
NCTS/IAMS PDE & Analysis Seminar	4/24	D	NCTS
One-Day Working Seminars on Probability	6/5	D	NCTS
Matrix Computation and Its Applications	2/14, 2/22, 3/7	E	NCTU
NCTS Seminar on Scientific Computing	1/17, 1/19, 2/20, 3/13, 5/17	E	NCTS / NCU
Round Table Discussion on Deep Learning	6/6	E	NCTS
NCTS Seminar on Mathematical Biology	3/3, 3/17, 3/24, 3/30, 4/14, 4/21, 4/28, 5/12, 5/26	F	NTHU
NCTS Interdisciplinary Research Seminar	2/23, 4,21, 4/27	F	NCTS
NCTS Seminar on Applied Mathematics	4/21	F	NCTS
Seminar on Big and Complex Data Analysis	5/11, 5/18, 5/24, 5/25	G	NSYSU
NCTS/NCU Harmonic Analysis Seminar	3/16, 3/17, 3/23, 3/24	H	NCU
NCTS Data Sciences Forum	1/24, 3/14, 3/30, 5/25, 6/15	L	NCTS
Taipei Postdoc Seminar	1/4, 2/22,3/1, 3/15,3/22, 3/29,4/12, 4/26, 5/3, 5/10, 5/11, 5/17, 5/24, 5/31, 6/7, 6/14	ALL	NCTS

11.5 List of Visitors

11.5.1 List of 2015 Visitors

Arr.Date	Dep.Date	Name	Gp.	Affiliation	Country	Title
2015/1/9	2015/1/16	Hua, Zheng	B	The University of Hong Kong	Hong Kong	Prof
2015/1/13	2015/1/15	Goebel, Kazimierz	A	Maria Curie-Sklodowska Univ.	Poland	Prof
2015/1/13	2015/1/15	Takahashi, Wataru	D	Tokyo Institute of Technology	Japan	Prof
2015/1/15	2015/1/19	Shimojo, Masahiko	D	Okayama University	Japan	Prof
2015/1/18	2015/1/22	Lin, Wei	All	Fudan University	China	Prof
2015/1/18	2015/1/23	Ogawa, Takayoshi	All	Tohoku University	Japan	Prof
2015/1/18	2015/1/23	He, Lingbing	All	Tsinghua University	China	Prof
2015/1/18	2015/1/24	Kim, Panki	All	Seoul National University	Korea	Prof
2015/1/18	2015/1/21	Motoko,Kotani	All	Tohoku University	Japan	Prof
2015/1/18	2015/1/21	Yoshio,Tsutsumi	All	Kyoto University	Japan	Prof
2015/1/18	2015/1/23	Wu, Quenshui	All	Fudan University	China	Prof
2015/1/18	2015/1/23	Wang, Zhiqiang	All	Fudan University	China	Prof
2015/1/18	2015/1/23	Yu, Pin	All	Fudan University	China	Prof
2015/1/18	2015/1/23	Zhong, Xuexiu	All	Tsinghua University	China	PhD
2015/1/18	2015/1/23	Xiong, Changwei	All	Tsinghua University	China	PhD
2015/1/18	2015/1/23	Yang, Enlin	All	Tsinghua University	China	PhD
2015/1/18	2015/1/23	Guan, KuoHui	All	Tsinghua University	China	PhD
2015/1/18	2015/1/23	Wang, YueXin	All	Tsinghua University	China	PhD
2015/1/18	2015/1/23	Ozawa, Tmomi	All	Tohoku University	Japan	PhD
2015/1/18	2015/1/23	Sato, Ryuichi	All	Tohoku University	Japan	PhD
2015/1/18	2015/1/23	Kato, Tsuyoshi	All	Tohoku University	Japan	PhD
2015/1/18	2015/1/23	Hasegawa, Shoichi	All	Tohoku University	Japan	PhD
2015/1/18	2015/1/23	Kunikawa, Keita	All	Tohoku University	Japan	PhD
2015/1/18	2015/1/23	Wang, Tzipeng	All	Fudan University	China	PhD
2015/1/18	2015/1/23	Yu, Wu	All	Fudan University	China	PhD
2015/1/18	2015/1/23	Kuang, Jie	All	Fudan University	China	PhD
2015/1/18	2015/1/23	Zhang, Liping	All	Fudan University	China	PhD
2015/1/18	2015/1/23	Ren, Yibin	C	Fudan University	China	PhD
2015/1/18	2015/1/23	Yi, Chow	All	Fudan University	China	PhD
2015/1/18	2015/1/23	Yokota, Maho	All	Kyoto University	Japan	PhD
2015/1/18	2015/1/23	Xiao, Jifu	All	Kyoto University	Japan	PhD
2015/1/18	2015/1/23	Minamide, Arata	All	Kyoto University	Japan	PhD
2015/1/18	2015/1/23	Yang, Yu	All	Kyoto University	China	PhD
2015/1/18	2015/1/23	Hasui, Sho	All	Kyoto University	China	PhD
2015/1/18	2015/1/23	Nishiguchi, Junya	All	Kyoto University	China	PhD
2015/1/18	2015/1/23	Gotoda, Takeshi	All	Kyoto University	China	PhD
2015/1/18	2015/1/23	Fukumoto, Yoshiyasu	All	Kyoto University	China	PhD
2015/1/18	2015/1/23	Komatsu, Takashi	All	Tohoku University	China	PhD
2015/1/18	2015/1/23	Yobuko, Fuetaro	All	Tohoku Universityn	China	PhD
2015/1/20	2015/1/23	Kim, Hyun Jin	All	Ewha Womans University	Korea	PhD
2015/1/18	2015/1/23	Kee, Minku	All	Ewha Womans University	Korea	PhD
2015/1/18	2015/1/23	Kim, Taekyung	All	Seoul National University	Korea	PhD
2015/1/18	2015/1/23	Song, Min Ho	All	Sungkyunkwan University	Korea	PhD
2015/1/18	2015/1/23	Mojallal, Seyedahmad	All	Sungkyunkwan University	Korea	PhD
2015/1/18	2015/1/23	Oh, Se Jin	All	Seoul National University	Korea	PhD
2015/1/18	2015/1/23	Yoon, Jihun	All	Seoul National University	Korea	PhD
2015/1/18	2015/1/23	Kim, Kyung Youn	All	Seoul National University	Korea	PhD
2015/1/18	2015/1/23	Oh, Jehan	All	Seoul National University	Korea	PhD
2015/1/18	2015/1/23	Choi, Woocheol	All	Seoul National University	Korea	PhD

2015/3/2	2015/3/6	Nonomura, Taku	E	JAXA	Japan	Prof
2015/3/2	2015/3/8	Kaji, Hajime	B	Waseda University	Japan	Prof
2015/3/3	2015/3/8	Luckhaus, Stephan	D	University of Leipzig	Germany	Prof
2015/3/4	2015/3/7	Suzuki, Taku	B	Waseda University	Japan	Prof
2015/3/4	2015/3/7	Watanabe, Kiwamu	B	Saitama University	Japan	Prof
2015/3/5	2015/3/7	Ishikawa, Daizo	B	Waseda University	Japan	PhD
2015/3/5	2015/3/7	Nagai, Yasunari	B	Waseda University	Japan	Prof
2015/3/8	2015/3/19	Wang, Zhi-Qiang	D	University of Utah	USA	Prof
2015/3/12	2015/3/16	Lai, King Fai	A	Capital Normal University	China	Prof
2015/3/12	2015/3/24	Dall'Acqua, Anna	D	University of Ulm	Germany	Prof
2015/3/13	2015/3/20	Trihan, Fabien	A	Sophia University	Japan	Prof
2015/3/14	2015/3/19	Kuwert, Ernst	C	University Freiburg	Germany	Prof
2015/3/22	2015/4/4	Shen, Zhongwei	D	University of Kentucky	USA	Prof
2015/3/24	2015/3/26	Tamagawa, Akio	A	RIMS	Japan	Prof
2015/4/1	2015/5/31	Li, Tie-Xiang	E	Southeast University	China	Prof
2015/4/7	2015/4/12	Gavrilyuk, Sergey	E	Aix-Marseille University	France	Prof
2015/4/12	2015/4/18	Jinbo, Yoshinori	E	Hokkaido University	Japan	PD
2015/4/23	2015/4/30	Ducrot, Arnaud	D	University of Bordeaux	France	Prof
2015/4/29	2015/5/12	Yao, Yuan	E	Peking University	China	Prof
2015/4/30	2015/5/23	Birkar , Caucher	B	University of Cambridge	UK	Prof
2015/5/1	2015/6/30	Brownawell, W. Dale	A	Pennsylvania State University	USA	Prof
2015/5/3	2015/5/5	Zhu, Xuding	A	Zhejiang Normal University	China	Prof
2015/5/12	2015/6/4	Wu, Hau-Tieng	E	University of Toronto	Canada	Prof
2015/5/15	2015/5/30	Chebotar, Mikhail	B	Kent State University	USA	Prof
2015/5/20	2015/5/27	Zhu, Yu-Jun	D	Hebei Normal University	China	Prof
2015/5/20	2015/5/24	Dong Han Kim	D	Dongguk University	Korea	Prof
2015/5/20	2015/5/24	Hiroki Takahasi	D	Keio University	Japan	Prof
2015/5/20	2015/5/24	Hiroshi Kokubu	D	Kyoto University	Japan	Prof
2015/5/20	2015/5/24	Kazuyuki Yagasaki	D	Kyoto University	Japan	Prof
2015/5/20	2015/5/24	Shin Kiriki	D	Tokai University	Japan	Prof
2015/5/20	2015/5/24	Yang Wang	D	Hong Kong University	Hong Kong	Prof
2015/5/20	2015/5/24	Yinfei Yi	D	Georgia Institute of Technology	USA	Prof
2015/5/20	2015/5/24	Jacques Peyriere	D	Universite Paris-Sud	France	Prof
2015/5/21	2015/6/4	Papanikolas, Matthew	A	Texas A&M University	USA	Prof
2015/5/22	2015/6/18	Choi, Yung-Sze	D	University of Connecticut	USA	Prof
2015/5/24	2015/7/11	Lo, Chieh Cheng	B	UIUC	USA	PD
2015/5/31	2015/6/13	Ren, Xiaofeng	F	George Washington University	USA	Prof
2015/5/31	2015/7/31	Yau, Horng-Tzer	C	Harvard University	USA	Prof
2015/6/1	2015/7/15	Tsai, Yen-Hsi Richard	E	UT Austin	USA	Prof
2015/6/1	2016/3/31	Jinbo, Yoshinori	E	Hokkaido University	Japan	PD
2015/6/3	2015/6/6	Takashi Teramoto	D	Asahikawa Medical University	Japan	Prof
2015/6/3	2015/6/11	Ni, Wei-Ming	D	University of Minnesota	USA	Prof
2015/6/4	2015/6/17	Wang, Shouhong	D	Indiana University	USA	Prof
2015/6/7	2015/6/19	Toschi, Federico	D	Eindhoven University of Tech.	Netherlands	Prof
2015/6/7	2015/6/19	Lee, Chung-Min	D	California State Univ., Long Beach	USA	Prof
2015/6/8	2015/6/15	Segata, Jun-ichi	D	Tohoku University	Japan	Prof
2015/6/11	2015/6/16	Mimura, Masayasu	D	Meiji University	Japan	Prof
2015/6/14	2015/6/20	Hu, Bei	D	University of Notre Dame	USA	Prof
2015/6/14	2015/7/10	Chen, Yu-Ting	D	Harvard University	USA	PD
2015/6/15	2015/7/4	Pei, Yuchen	D	University of Warwick	UK	PD

2015/6/16	2015/6/26	Furutani, Kenro	H	Tokyo University of Science	Japan	Prof
2015/6/19	2015/6/27	Bauer, Wolfram	H	Leibniz University at Hannover	Germany	Prof
2015/6/20	2015/6/27	Lotay, Jason D.	D	University College London	UK	Prof
2015/6/22	2015/7/8	Xiang, Qing	B	University of Delaware	USA	Prof
2015/6/22	2015/7/17	Che, Ziliang	C	Harvard University	USA	PhD
2015/6/23	2015/7/2	Chang, Der-Chen	H	Georgetown University	USA	Prof
2015/6/23	2015/6/26	Iwasaki Chisato	H	University of Osaka	Japan	Prof
2015/6/23	2015/6/26	Li, Yutain	H	Hong Kong Baptist University	Hong Kong	Prof
2015/6/23	2015/6/26	Wang, Wei	H	Zhejiang University	China	Prof
2015/6/23	2015/6/26	Xiaojing Lyu	H	University of Potsdam	Germany	PD
2015/6/23	2015/7/3	Schulze, Bert-Wolfgang	H	University of Potsdam	Germany	Prof
2015/6/24	2015/7/1	Yau, Stephen S-T.	B	Tsinghua University	China	Prof
2015/6/24	2015/7/31	Liu, Chun-Hung	A	Princeton University	USA	PD
2015/6/25	2015/7/20	Liu, Daphne Der-Fen	A	Calif. State Univ., Los Angeles	USA	Prof
2015/7/1	2015/9/3	Wang, Haining	A	Penn. State Univ.	USA	PhD
2015/7/4	2015/7/31	Xue, Jiangwei	A	Wuhan University	China	Prof
2015/7/15	2015/8/15	Shedden, Kerby	G	University of Michigan	USA	Prof
2015/7/20	2015/7/24	Liu, Hongyu	D	Hong Kong Baptist University	Hong Kong	Prof
2015/7/22	2015/8/21	Lin, Chin-Hung	A	Iowa State University	USA	Stu
2015/7/26	2015/7/31	Jin, Shi	E	Univ. of Wisconsin at Madison	USA	Prof
2015/7/29	2015/7/30	Ma, Man Shun John	D	University of British Columbia	Canada	PhD
2015/8/1	2015/8/23	Birkar , Caucher	B	University of Cambridge	UK	Prof
2015/8/2	2015/8/30	Kawamata, Yujiro	B	University of Tokyo	Japan	Prof
2015/8/3	2015/8/21	Chen, Po-Ning	C	Columbia University	USA	Prof
2015/8/3	2015/8/21	Wang, Ye-Kai	C	Michigan State University	USA	PD
2015/8/11	2015/8/23	Wang, Mu-Tao	C	Columbia University	USA	Prof
2015/8/12	2015/8/24	Okawa, Shinnosuke	B	Osaka University	Japan	Prof
2015/8/14	2015/8/22	Hung, Pei-Ken	C	Columbia University	USA	PhD
2015/8/14	2015/8/31	Ito, Atsushi	B	Kyoto University	Japan	P
2015/8/16	2015/8/30	Hu, Xianpeng	F	CUHK	Hong Kong	Prof
2015/8/17	2015/8/27	Sosna Pawel	B	University of hamburg	Germany	Prof
2015/8/18	2015/8/27	Min, Misun	F	Argonne National Laboratory	USA	Prof
2015/8/18	2015/8/23	Patakfalvi, Zsolt	B	Princeton University	USA	PD
2015/8/18	2015/8/23	Choi, Sung Rak	B	Institute for Basic Science	Korea	PD
2015/8/18	2015/8/23	Lee, Yongnam	B	KAIST	Korea	Prof
2015/8/18	2015/8/24	Chen, Jiang	B	University of Tokyo	Japan	PD
2015/8/18	2015/8/24	Sannai, Akiyoshi	B	University of Tokyo	Japan	Prof
2015/8/18	2015/8/24	Ejiri, Sho	B	University of Tokyo	Japan	Prof
2015/8/18	2015/8/24	Gongyo, Yoshinori	B	University of Tokyo	Japan	Prof
2015/8/18	2015/8/24	Sano, Taro	B	Kyoto University	Japan	PD
2015/8/18	2015/8/24	Nakamura, Yusuke	B	University of Tokyo	Japan	Prof
2015/8/18	2015/8/26	Chen, Meng	B	Fudan University	China	Prof
2015/8/18	2015/8/27	Fu, Bao-Hua	B	Chinese Academy of Sciences	China	Prof
2015/8/19	2015/8/21	Lin, Jessica	D	Univ. of Wisconsin at Madison	USA	Stu
2015/8/20	2015/8/23	Takagi, Shunsuke	B	University of Tokyo	Japan	Prof
2015/8/30	2015/9/24	Hoshi, Akinari	D	Niigata University	Japan	Prof
2015/8/30	2015/9/24	Yamasaki, Aiichi	D	Kyoto University	Japan	Prof
2015/8/31	2015/9/6	Ma, Yu-Mei	D	Dalian Nationalities University	China	Prof
2015/9/13	2015/9/19	Ethan, Deyle	F	Univ. of California, San Diego	USA	Prof
2015/9/14	2015/9/19	Sugihara, George	F	Univ. of California, San Diego	USA	Prof
2015/9/14	2015/9/19	Telschow, Arndt	F	University of Munster	Germany	Prof
2015/9/15	2015/9/18	Boettiger, Carl	F	University of California-Berkeley	USA	Prof
2015/9/15	2015/9/19	Munch, Stephan	F	NOAA	USA	Prof

2015/9/15	2015/9/19	Ushio, Masayuki	F	Ryukoky University	Japan	Prof
2015/9/15	2015/9/20	Van Ness, Egbert	F	Wageningen University	Netherlands	Prof
2015/9/15	2015/9/20	Tsai, Cheng-Han	F	James Cook University	Australia	Prof
2015/9/15	2015/9/28	Tasaka, Koji	A	Nagoya University	Japan	Prof
2015/9/17	2015/9/21	Guest, Martin A.	C	Waseda University	Japan	Prof
2015/9/21	2015/11/20	Fang, Xiaoli	D	Shaoxing University	China	Prof
2015/9/27	2015/10/10	Ni, Wei-Ming	D	University of Minnesota	USA	Prof
2015/9/27	2015/10/7	Suzuki, Masahiro	D	Tokyo Institue of Technology	Japan	Prof
2015/10/1	2015/12/23	Graham, Fan Chung	C	Univ. of California, San Diego	USA	Prof
2015/10/2	2015/12/15	Aksoy, Sinan G.	C	Univ. of California, San Diego	USA	PD
2015/10/1	2015/10/6	Kwon, Bongsuk	D	Ulsan Nat'l Inst. of Sci. and Tech.	Korea	Prof
2015/10/16	2015/10/23	Roche-Newton, Oliver	H	Wuhan University	China	Prof
2015/10/25	2015/11/15	Aguda, Baltazar D.	F	Disease Pathways LLC	USA	Prof
2015/10/25	2015/11/1	Sneppen, Kim	F	University of Copenhagen	Denmark	Prof
2015/10/25	2015/11/1	Bosia, Carla	F	Human Genetics Found. Torino	Italy	PD
2015/10/28	2015/10/30	Fried, Eliot	C	Okinawa Inst. Sci. and Tech.	Japan	Prof
2015/10/28	2015/11/4	Chen, I-Kun	D	Kyoto University	Japan	Prof.
2015/11/1	2016/2/1	Ha Seung-Yeal	D	Seoul National University	Korea	Prof
2015/11/5	2015/11/10	Pyo, Juncheol	C	Pusan National University	Korea	Prof
2015/11/5	2015/11/10	Lee, Hojoo	C	KIAS	Korea	Prof
2015/11/10	2015/11/19	Sere, Eric	D	University Paris-Dauphine	France	Prof
2015/11/8	2015/11/11	Kang, Hyeonbae	D	Inha University	Korea	Prof
2015/11/15	2015/12/13	Wang, Jiaping	C	University of Minnesota	USA	Prof
2015/11/18	2015/11/26	Heijster, Petrus van	E	Queensland Univ. of Tech.	Australia	Prof.
2015/11/20	2015/12/2	Jiang, Ming	E	Peiking University	China	Prof
2015/12/12	2015/12/18	Wang, Mu-Tao	C	Columbia University	USA	Prof
2015/12/15	2016/1/7	Chen, Miaofen	A	East China Normal University	China	Prof
2015/12/15	2016/1/2	Shen Xu	A	Chinese Academy of Sciences	China	Prof
2015/12/16	2015/12/28	Nie, Sian	A	Chinese Academy of Sciences	China	Prof
2015/12/16	2016/1/6	Jiang, Zhi	B	Paris Sud	France	Prof
2015/12/19	2015/12/30	Yasuda, Seidai	A	Osaka University	Japan	Prof
2015/12/20	2015/12/26	Duong, Xuan Thinh	C	Macquarie University	Australia	Prof
2015/12/21	2016/1/12	Geisser, Thomas	B	Nagoya University	Japan	Prof

11.5.2 List of 2016 Visitors

Arr. Date	Dep. Date	Name	Gp.	Affiliation	Country	Title
2016/1/1	2016/1/18	Hau-Tieng Wu	E	University of Toronto	Canada	Prof
2016/1/3	2016/1/7	Kenichi Namikawa	A	Tokyo Denki University	Japan	Prof
2016/1/10	2016/1/23	Nicola Fusco	D	University of Naples	Italy	Prof
2016/1/10	2016/1/22	Rupert McCallum	A	University of Tbingen	Germany	PD
2016/1/11	2016/1/31	Xiongtao Zhang	D	Seoul National University	Korea	PD
2016/1/11	2016/2/29	Fang-Ting Tu	A	Inst. Comput. Exp. Res. Math.	USA	PD
2016/1/11	2016/1/21	Rita Fioresi	A	University of Bologna	Italy	Prof
2016/1/11	2016/1/15	Tatsuki Hayama	C	Sensui University	Japan	Prof
2016/1/11	2016/1/15	Kiwamu Watanabe	B	Saitama University	Japan	Prof
2016/1/11	2016/1/15	Takuzo Okada	B	Saga University	Japan	Prof
2016/1/11	2016/1/15	Hisanori Ohashi	B	Tokyo University of Science	Japan	Prof
2016/1/11	2016/1/15	Yoshinori Gongyo	B	University of Tokyo	Japan	Prof
2016/1/11	2016/1/15	Akihiro Kanemitsu	C	University of Tokyo	Japan	Prof
2016/1/11	2016/1/15	Sho Ejiri	C	University of Tokyo	Japan	PhD
2016/1/11	2016/1/15	Kento Fujita	C	Kyoto University	Japan	Prof
2016/1/11	2016/1/15	Kenji Hashimoto	C	Max Planck Institute	Germany	PhD
2016/1/11	2016/1/15	Nobuo Hara	C	Tokyo Univ of Agr. and Tech.	Japan	Prof
2016/1/11	2016/1/15	Hajime Kaji	B	Waseda University	Japan	Prof
2016/1/12	2016/1/19	Chi-Kun Lin	D	Xi'an Jiaotong-Liverpool Univ.	China	Prof
2016/1/13	2016/1/22	Man-Chun Lee	C	CUHK	Hong Kong	PhD
2016/1/15	2016/2/15	Ting-Hui Yang	D	Tamkang University	Taiwan	Prof
2016/1/15	2016/1/22	Eugene Zhu Xia	B	National Cheng Kung University	Taiwan	Prof
2016/1/18	2016/2/18	Feng-Bin Wang	F	Chang Gung University	Taiwan	Prof
2016/1/18	2016/1/22	Shih-Cheng Kang	B	National Cheng Kung University	Taiwan	PhD
2016/1/18	2016/1/28	Man-Kam Kwong	D	The Hong Kong Poly. Univ.	Hong Kong	Prof
2016/1/18	2016/1/22	Qing Han	C	University of Notre Dame	USA	Prof
2016/1/18	2016/1/22	Robin Graham	C	University of Washington	USA	Prof
2016/1/18	2016/1/22	John Bland	C	University of Toronto	Canada	Prof
2016/1/18	2016/1/22	Olivier Biquard	C	Université Pierre et Marie Curie	France	Prof
2016/1/18	2016/1/22	Kengo Hirachi	C	University of Tokyo	Japan	Prof
2016/1/18	2016/1/22	John M.Lee	C	University of Washington	USA	Prof
2016/1/18	2016/1/22	Tongzhu Li	C	Beijing Institute of Technology	China	Prof
2016/1/18	2016/1/22	Andrea Malchiodi	C	Scuola Normale Superiore	Italy	Prof
2016/1/18	2016/1/22	Fernando Marques	C	Princeton University	USA	Prof
2016/1/18	2016/1/22	Davi Maximo	C	Stanford University	USA	Prof
2016/1/18	2016/1/22	Ana Menezes	C	Princeton University	USA	Prof
2016/1/18	2016/1/22	Jie Qing	C	UC Santa Cruz	USA	Prof
2016/1/18	2016/1/22	Tristan Riviere	C	ETH Zrich	Switzerland	Prof
2016/1/18	2016/1/22	Yuguang Shi	C	Peking University	China	Prof
2016/1/18	2016/1/22	Peter Topping	C	University of Warwick	UK	Prof
2016/1/18	2016/1/22	Yi Wang	F	Univ. of Sci. and Tech. of China	China	Prof
2016/1/18	2016/1/22	Xiaodong Wang	C	Michigan State University	USA	Prof
2016/1/18	2016/1/22	Paul Yang	C	Princeton University	USA	Prof
2016/2/11	2016/2/25	Shinichi Kobayashi	A	Tohoku University	Japan	Prof
2016/2/15	2016/2/20	Xing-Bin Pan	D	East China Normal University	China	Prof
2016/2/17	2016/2/24	Mikiya Masuda	C	Osaka City University	Japan	Prof
2016/2/18	2016/2/19	Wen-Guei Hu	C	Sichuan University	China	Prof
2016/2/24	2016/2/26	Masayasu Mimura	D	Meiji University	Japan	Prof
2016/2/24	2016/2/26	Yotsutani Shoji	F	Ryukoku University	Japan	Prof
2016/2/25	2016/2/29	Yoshihisa Morita	D	Ryukoku University	Japan	Prof
2016/2/26	2016/3/1	Mayuko Iwamoto	F	Meiji University	Japan	Prof
2016/2/26	2016/3/1	Akiyasu Tomoeda	F	Musashino University	Japan	Prof
2016/2/26	2016/3/1	Shuichi Kinoshita	F	Musashino University	Japan	Prof
2016/2/26	2016/3/1	Daishin Ueyama	F	Meiji University	Japan	Prof
2016/2/26	2016/3/1	Tomoyuki Miyaji	D	Meiji University	Japan	Prof

2016/2/26	2016/2/26	Kota Ikeda	D	Meiji University	Japan	Prof
2016/2/26	2016/2/26	Masayasu Mimura	D	Meiji University	Japan	Prof
2016/2/26	2016/2/26	Yoshihisa Morita	D	Ryukoku University	Japan	Prof
2016/2/26	2016/2/26	Shoji Yotsutani	D	Ryukoku University	Japan	Prof
2016/2/26	2016/2/26	Hirokazu Ninomiya	F	Meiji University	Japan	Prof
2016/2/28	2016/3/4	François Loeser	B	Université Pierre et Marie Curie	France	Prof
2016/2/29	2016/3/12	Christian Klingenberg	F	Wrzburg University	Germany	Prof
2016/3/1	2016/3/31	Wei-Shih Yang	D	Temple University	USA	Prof
2016/3/1	2016/3/31	Yongsheng Han	H	Auburn University	USA	Prof
2016/3/4	2016/3/19	Kenichi Namikawa	A	Tokyo Denki University	Japan	Prof
2016/3/5	2016/3/13	Matt Holzer	F	George Mason University	USA	Prof
2016/3/6	2016/3/31	Masayuki Kawakita	B	RIMS	Japan	Prof
2016/3/7	2016/3/29	Jerry L. Bona	D	University of Illinois at Chicago	USA	Prof
2016/3/7	2016/3/29	Hongqiu Chen	D	University of Memphis	USA	Prof
2016/3/7	2016/3/9	Naotaka Kajino	D	Kobe University	Japan	Prof
2016/3/7	2016/3/9	Panki Kim	D	Seoul National University	Korea	Prof
2016/3/7	2016/3/9	Takashi Kumagai	D	RIMS	Japan	Prof
2016/3/7	2016/3/9	Akira Sakai	D	Hokkaido University	Japan	Prof
2016/3/7	2016/3/9	Jian Wang	D	Fujian Normal University	China	Prof
2016/3/10	2016/3/18	Hiroshi Fujiwara	E	Kyoto University	Japan	Prof
2016/3/13	2016/3/13	Jerry L. Bona	D	University of Illinois at Chicago	USA	Prof
2016/3/13	2016/3/13	Hongqiu Chen	D	University of Memphis	USA	Prof
2016/3/14	2016/3/16	Mu-Tao Wang	C	Columbia University	USA	Prof
2016/3/14	2016/4/2	Yujiro Kawamata	B	University of Tokyo	Japan	Prof
2016/3/14	2016/4/8	Eric K.-w Chu	E	Monash University	Australia	Prof
2016/3/15	2016/4/9	Paolo Cascini	B	Imperial College London	UK	Prof
2016/3/15	2016/4/15	Tie-Xiang Li	E	Southeast University	China	Prof
2016/3/15	2016/4/13	King Fai Lai	A	Capital Normal University	China	Prof
2016/3/20	2016/3/28	Rio Yokota	E	Tokyo Institute of Technology	Japan	Prof
2016/3/20	2016/3/26	Richard Pasquetti	E	Université Nice Sophia Antipolis	France	Prof
2016/3/21	2016/3/25	Masahiko Miyamoto	A	University of Tsukuba	Japan	Prof
2016/3/21	2016/3/25	Hiroshi Yamuchi	A	Tokyo Woman's Christian Univ.	Japan	Prof
2016/3/21	2016/3/25	Chong-Ying Dong	A	UC Santa Cruz	USA	Prof
2016/3/21	2016/3/25	CuiPo Jiang	A	Shanghai Jiao Tong University	China	Prof
2016/3/21	2016/3/25	Hiroki Shimakura	A	Kyoto University	Japan	Prof
2016/3/21	2016/3/25	Hiromichi Yamada	A	University of Tokyo	Japan	Prof
2016/3/21	2016/3/25	Yusuke Arike	A	University of Tsukuba	Japan	Prof
2016/3/21	2016/3/25	Koichiro Harada	A	University of Tokyo	Japan	Prof
2016/3/21	2016/3/25	Koichi Betsumiya	A	Hirosaki University	Japan	Prof
2016/3/21	2016/3/25	Kuwabara Toshiro	A	University of Tsukuba	Japan	PhD
2016/3/21	2016/3/25	Tanabe Kenichiro	A	Hokkaido University	Japan	Prof
2016/3/23	2016/3/27	Brian Smithling	A	Johns Hopkins University	USA	Prof
2016/3/23	2016/3/27	Torsten Wedhorn	A	Technische Universität Darmstadt	Germany	Prof
2016/3/24	2016/3/26	Jishan Hu	D	HKUST	Hong Kong	Prof
2016/3/24	2016/3/26	Yutian Li	D	Hong Kong Baptist University	Hong Kong	Prof
2016/3/24	2016/3/26	Wei Wang	D	Zhejiang University	China	Prof
2016/3/24	2016/3/26	Chisato Iwasaki	D	Osaka University	Japan	Prof
2016/3/26	2016/3/27	Feng-Bin Wang	F	Chang Gung University	Taiwan	Prof
2016/3/27	2016/3/31	Yoshinori Gongyo	B	University of Tokyo	Japan	Prof
2016/3/28	2016/3/28	Tetsuya Ishiwata	D	Shibaura Institute of Technology	Japan	Prof
2016/4/1	2016/5/31	Denny H. Leung	H	National University of Singapore	Singapore	Prof
2016/4/1	2016/6/30	Gen Nakamura	D	Inha University	Korea	Prof
2016/4/11	2016/4/16	Yau Shu Wong	E	University of Alberta	Canada	Prof

2016/4/11	2019/3/31	Kazuo Aoki	F	Kyoto Univ./ NCTS	Japan	Prof
2016/4/12	2016/4/26	Viktor Ginzburg	C	UC Santa Cruz	USA	Prof
2016/4/15	2016/5/14	Rejeb Hadiji	F	Universitá Paris-Est Créteil	France	Prof
2016/4/20	2016/7/18	Isao Ishikawa	A	Kyoto University	Japan	PhD
2016/4/27	2016/5/5	Pen-Yuan Hsu	F	University of Tokyo	Japan	PD
2016/4/28	2016/5/3	Manabu Machida	D	Hamamatsu Univ, School of Med.	Japan	Prof
2016/5/1	2016/5/20	Edmond Chow	E	Georgia Institute of Technology	USA	Prof
2016/5/2	2016/5/10	Hirokazu Ninomiya	F	Meiji University	Japan	Prof
2016/5/10	2016/5/15	Miyuki Koiso	C	Kyushu University	Japan	Prof
2016/5/11	2016/5/19	Daniel B. Szyld	E	Temple University	USA	Prof
2016/5/12	2016/5/19	Eric Chu	D	Monash University	Australia	Prof
2016/5/13	2016/5/26	Shuanglin Shao	H	University of Kansas	USA	Prof
2016/5/17	2016/5/30	Der-Chen Chang	C	Georgetown University	USA	Prof
2016/5/19	2016/5/28	Stephen Schecter	F	North Carolina State University	USA	Prof
2016/5/19	2016/5/25	Wei-Ming Ni	D	University of Minnesota	USA	Prof
2016/5/20	2016/5/24	Yijun Lou	F	The Hong Kong Poly. Univ.	Hong Kong	Prof
2016/5/20	2016/5/24	Keng Deng	F	Univ. Louisiana at Lafayette	USA	Prof
2016/5/20	2016/5/20	Regina Liu	F	Rutgers University	USA	Prof
2016/5/21	2016/6/26	Yu Jin	F	University of Nebraska-Lincoln	USA	Prof
2016/5/21	2016/5/23	Jian Fang	F	Harbin Institute of Technology	China	Prof
2016/5/21	2016/5/23	Kohei Yoshiyama	F	Gifu University	Japan	Prof
2016/5/21	2016/5/23	Xiaoqiang Zhao	F	Memorial Univ. Newfoundland	Canada	Prof
2016/5/23	2016/5/25	Qin Tim Sheng	E	Baylor University	USA	Prof
2016/5/23	2016/5/27	Paul Hamacher	A	Technische Universität München	Germany	Prof
2016/5/24	2016/5/27	Wolfgang Schulze	D	University of Potsdam	Germany	Prof
2016/5/24	2016/5/26	Alex Vasiliev	D	University of Bergen	Norway	Prof
2016/5/24	2016/5/26	Irina Markina	D	University of Bergen	Norway	Prof
2016/5/24	2016/5/26	Wolfram Bauer	D	Leibniz Universität Hannover	Germany	Prof
2016/5/24	2016/5/26	Kenro Furutani	D	Tokyo University of Science	Japan	Prof
2016/5/26	2016/6/1	Hans G. Kaper	E	Georgetown University	USA	Prof
2016/5/27	2016/6/3	Matthew Papanikolas	A	Texas A&M University	USA	Prof
2016/5/30	2016/6/3	Miaofen Chen	A	East China Normal University	China	Prof
2016/5/30	2016/6/3	Laurent Fargues	A	CNRS	France	Prof
2016/5/30	2016/6/3	Ruochuan Liu	A	Peking University	China	Prof
2016/5/30	2016/6/3	Sian Nie	A	Chinese Academy of Sciences	China	Prof
2016/5/30	2016/6/3	Mao Sheng	A	Univ. of Sci. and Tech. of China	China	Prof
2016/5/30	2016/6/3	Xu Shen	A	Chinese Academy of Sciences	China	Prof
2016/5/30	2016/6/3	Rong Zhou	A	Harvard University	USA	Prof
2016/5/30	2016/6/3	Xinwen Zhu	A	California Institute of Technology	USA	Prof
2016/5/30	2016/6/3	Sug Woo Shin	A	UC Berkeley	USA	Prof
2016/5/30	2016/6/3	Brian Smithling	A	Johns Hopkins University	USA	Prof
2016/5/30	2016/6/3	Yoshinori Mishiba	A	Oyama College	Japan	Prof
2016/5/30	2016/6/3	Keerthi Madapusi Pera	A	University of Chicago	USA	Prof
2016/5/30	2016/6/3	Paul Hamacher	A	Technische Universität München	Germany	Prof
2016/5/30	2016/6/3	Ulrich Görtz	A	Universität Duisburg-Essen	Germany	Prof
2016/5/30	2016/6/3	Ana Caraiani	A	Princeton University	USA	Prof
2016/5/31	2016/6/5	Satoshi Sasayama	D	Hokkaido University	Japan	PD
2016/6/1	2016/7/31	Ye-Kai Wang	C	Michigan State University	USA	Prof
2016/6/3	2016/6/7	Martin Guest	C	Waseda University	Japan	Prof
2016/6/5	2016/6/17	Olof Runborg	E	KTH Royal Institute of Tech.	Sweden	Prof
2016/6/6	2016/6/11	Reyer Sjamaar	C	Cornell University	USA	Prof
2016/6/7	2016/6/16	Xudong Chen	D	National University of Singapore	Singapore	Prof

2016/6/8	2016/6/8	Hsuan-Yi Liao	D	Pennsylvania State University	USA	PhD
2016/6/10	2016/6/19	Ming-Deh A. Huang	B	University of Southern California	USA	Prof
2016/6/15	2016/6/30	Yung-Sze Choi	D	University of Connecticut	USA	Prof
2016/6/16	2016/6/21	Kazushi Ueda	C	University of Tokyo	Japan	Prof
2016/6/17	2016/6/24	Stephen S-T. Yau	A	Tsinghua University	China	Prof
2016/6/19	2016/8/14	Mu-Tao Wang	C	Columbia University	USA	Prof
2016/6/20	2016/7/31	Hau-Tieng Wu	E	University of Toronto	Canada	Prof
2016/6/21	2016/6/27	Da Zhou	G	Xiamen University	China	Prof
2016/6/21	2016/7/27	Chi-Jen Wang	F	Georgia Institute of Technology	USA	Prof
2016/6/24	2016/7/16	John H. Coates	A	University of Cambridge	UK	Prof
2016/6/26	2016/7/12	Horng-Tzer Yau	D	Harvard University	USA	Prof
2016/6/30	2016/6/30	Shaw-Hwa Lo	D	Columbia University	USA	Prof
2016/6/30	2016/6/30	Tian Zheng	G	Columbia University	USA	Prof
2016/7/1	2017/1/31	Yunping Jiang	D	The City University of New York	USA	Prof
2016/7/2	2016/8/1	Yen-Hsi Richard Tsai	D	University of Texas at Austin	USA	Prof
2016/7/3	2016/7/17	Romyar T. Sharifi	A	University of Arizona	USA	Prof
2016/7/6	2016/7/13	Yu-Ting Chen	D	Harvard University	USA	PD
2016/7/6	2016/7/18	Meng Fai Lim	A	Central China Normal University	China	Prof
2016/7/8	2016/7/31	Jordan Keller	C	Columbia University	USA	PhD
2016/7/10	2016/8/10	Yibin Ren	C	Zhejiang Normal University	China	PD
2016/7/10	2016/7/15	Shuyang Cheng	A	University of Chicago	USA	Prof
2016/7/11	2016/8/5	Damin Wu	C	University of Connecticut	USA	Prof
2016/7/11	2016/8/5	Lan-Hsuan Huang	C	University of Connecticut	USA	Prof
2016/7/11	2016/7/15	Wen-Ching Winnie Li	A	Pennsylvania State University	USA	Prof
2016/7/11	2016/7/15	Raphael Beuzart-plessis	A	National University of Singapore	Singapore	Prof
2016/7/11	2016/7/15	Soumya Das	A	Indian Institutes of Technology	India	Prof
2016/7/11	2016/7/15	Radhika Ganapathy	A	Tata Institute	India	Prof
2016/7/11	2016/7/15	Hiraku Atobe	A	Kyoto University	Japan	PD
2016/7/11	2016/7/15	Tong Liu	A	Purdue University	USA	Prof
2016/7/11	2016/7/15	Guangshi Lü	A	Shandong University	China	Prof
2016/7/11	2016/7/15	Chol Park	A	KIAS	Korea	Prof
2016/7/11	2016/7/15	Takeshi Saito	A	University of Tokyo	Japan	Prof
2016/7/11	2016/7/15	Romyar T. Sharifi	A	University of Arizona	USA	Prof
2016/7/11	2016/7/15	Florian Sprung	A	Princeton University	USA	Prof
2016/7/11	2016/7/15	Zhiren Wang	A	Pennsylvania State University	USA	Prof
2016/7/11	2016/7/15	Peng-Jie wong	A	Queen's University	Canada	Prof
2016/7/11	2016/7/15	Hang Xue	A	Max Planck Institute	Germany	Prof
2016/7/11	2016/7/15	John Coates	A	University of Cambridge	UK	Prof
2016/7/11	2016/7/15	Wee Teck Gan	A	National University of Singapore	Singapore	Prof
2016/7/11	2016/7/15	Tamotsu Ikeda	A	Kyoto University	Japan	Prof
2016/7/11	2016/7/15	Kazuya Kato	A	University of Chicago	USA	Prof
2016/7/11	2016/7/15	Minhyong Kim	A	University of Oxford	UK	Prof
2016/7/11	2016/7/15	Bào Châu Ngô	A	University of Chicago	USA	Prof
2016/7/11	2016/7/15	Sujatha Ramdorai	A	University of British Columbia	Canada	Prof
2016/7/11	2016/7/15	Ye Tian	A	Chinese Academy of Sciences	China	Prof
2016/7/14	2016/7/16	Zhizhang Wang	C	Fudan University	China	Prof
2016/7/15	2016/8/22	Chun-Hung Liu	A	Princeton University	USA	PD
2016/7/15	2016/8/2	Xuding Zhu	A	Zhejiang Normal University	China	Prof
2016/7/23	2016/8/8	Qingbo Huang	H	Wright State University	USA	Prof
2016/7/24	2016/7/30	Cheuk Yu Mak	B	University of Minnesota	USA	PD
2016/7/24	2016/7/29	Pei-Ken Hung	C	Columbia University	USA	PhD
2016/7/24	2016/7/30	Jongil Park	C	Seoul National University	Korea	Prof
2016/7/25	2016/8/9	Di-Ming Lu	B	Zhejiang University	China	Prof
2016/7/25	2016/8/3	Daphne Der-Fen Liu	A	Cal. State Univ., Los Angeles	USA	Prof

2016/7/26	2016/7/26	Ivan Davydov	E	Sobolev Institute of Mathematics	Russia	Prof
2016/7/26	2016/7/26	Yuri Kochetov	E	Sobolev Institute of Mathematics	Russia	Prof
2016/7/28	2016/8/13	Pengzi Miao	C	University of Miami	USA	Prof
2016/7/30	2016/8/6	Simon Blatt	C	University of Salzburg	Austria	PD
2016/8/1	2016/8/31	Hua Nie	F	Zhejiang University	China	Prof
2016/8/1	2016/8/31	Tomoya Wada	D	Tokyo Univ. of Agr. and Tech.	Japan	PhD
2016/8/1	2016/8/31	Xiwu Han	D	Beijing Institute of Technology	China	PhD
2016/8/1	2016/8/31	Jing Wang	D	Beijing Institute of Technology	China	PhD
2016/8/1	2016/8/30	Simone Fiori	D	Marche Polytechnic University	Italy	Prof
2016/8/3	2016/8/26	William C. Abram	D	Hillsdale College	USA	Prof
2016/8/5	2016/8/19	Wen-Xin Qin	D	Suzhou University	China	Prof
2016/8/5	2016/9/16	Tomohiro Uchiyama	B	The University of Auckland	New Zealand	PD
2016/8/9	2016/8/19	Derong Kong	D	Yangzhou University	China	Prof
2016/8/10	2016/9/25	Akinari Hoshi	A	Niigata University	Japan	Prof
2016/8/10	2016/8/30	Yun Zhao	D	Suzhou University	China	Prof
2016/8/10	2016/8/19	Yaping Wu	F	Capital Normal University	China	Prof
2016/8/11	2016/8/16	Tomoki Kawahira	D	Tokyo Institute of Tech.	Japan	Prof
2016/8/12	2016/8/26	Yongluo Cao	D	Suzhou University	China	Prof
2016/8/13	2016/8/17	Doowon Koh	H	Chungbuk National University	Korea	Prof
2016/8/14	2016/8/23	Ai-Hua Fan	D	Université de Picardie	France	Prof
2016/8/14	2016/8/23	Wen Huang	D	Sichuan University	China	Prof
2016/8/14	2016/8/22	Shi-Liang Wu	D	Xidian University	China	Prof
2016/8/14	2016/8/31	I-Kun Chen	D	Kyoto University	Japan	PD
2016/8/14	2016/8/19	Shilei Fan	D	Central China Normal University	China	Prof
2016/8/14	2016/8/19	Ercai Chen	D	Nanjing Normal University	China	Prof
2016/8/15	2016/8/18	Yunping Jiang	D	The City University of New York	USA	Prof
2016/8/15	2016/8/18	Wen-Guei Hu	C	Sichuan University	China	Prof
2016/8/15	2016/8/18	Hui Rao	D	Central China Normal University	China	Prof
2016/8/15	2016/8/18	Dejun Feng	D	CUHK	Hong Kong	Prof
2016/8/15	2016/8/18	Kasing Lau	D	CUHK	Hong Kong	Prof
2016/8/15	2016/8/18	Yang Wang	D	HKUST	Hong Kong	Prof
2016/8/15	2016/8/18	Zhou Ping Xin	D	CUHK	Hong Kong	Prof
2016/8/15	2016/8/18	Tomoki Kawahira	D	Tokyo Institute of Technology	Japan	Prof
2016/8/15	2016/8/18	Mansoor Saburov	D	Int'l Islamic Univ. Malaysia	Malaysia	Prof
2016/8/15	2016/8/18	William C. Abram	D	Hillsdale College	USA	Prof
2016/8/15	2016/8/18	Lingmin Liao	D	Université Paris-Est Créteil	France	Prof
2016/8/18	2016/9/3	Yoshinori Mishiba	A	Oyama College	Japan	Prof
2016/8/20	2016/12/20	Yung-Sze Choi	D	University of Connecticut	USA	Prof
2016/8/22	2016/8/26	Tomoyuki Arakawa	A	Kyoto University	Japan	Prof
2016/8/22	2016/8/26	Chong-Ying Dong	A	UC Santa Cruz	USA	Prof
2016/8/22	2016/8/26	John Duncan	A	Emory University	USA	Prof
2016/8/22	2016/8/26	Daniel Frohardt	A	Wayne State University	USA	Prof
2016/8/22	2016/8/26	Terry Gannon	A	University of Alberta	Canada	Prof
2016/8/22	2016/8/26	George Glauberman	A	University of Chicago	USA	Prof
2016/8/22	2016/8/26	Jonathan Hall	A	Michigan State University	USA	Prof
2016/8/22	2016/8/26	Koichiro Harada	A	University of Tokyo	Japan	Prof
2016/8/22	2016/8/26	Gerald Höhn	A	Kansas State University	USA	Prof
2016/8/22	2016/8/26	CuiPo Jiang	A	Shanghai Jiao Tong University	China	Prof
2016/8/22	2016/8/26	Naihuan Jing	A	North Carolina State University	USA	Prof
2016/8/22	2016/8/26	Haisheng Li	A	Rutgers University	USA	Prof
2016/8/22	2016/8/26	Kay Magaard	A	University of Birmingham	UK	Prof
2016/8/22	2016/8/26	Masahiko Miyamoto	A	University of Tsukuba	Japan	Prof
2016/8/22	2016/8/26	Alex Ryba	A	City University of New York	USA	Prof
2016/8/22	2016/8/26	Leonard Scott	A	University of Virginia	USA	Prof

2016/8/22	2016/8/26	Yoav Segev	A	Ben-Gurion Univ. of the Negev	Israel	Prof
2016/8/22	2016/8/26	Peter Sin	A	University Of Florida	USA	Prof
2016/8/22	2016/8/26	Hiroki Shimakura	A	Kyoto University	Japan	Prof
2016/8/22	2016/8/26	Stephen Smith	A	University of Illinois at Chicago	USA	Prof
2016/8/22	2016/8/26	Pham Huu Tiep	A	University of Arizona	USA	Prof
2016/8/25	2016/9/23	Aiichi Yamasaki	A	Kyoto University	Japan	Prof
2016/8/25	2016/8/31	Ryo Okawa	B	RIMS	Japan	Prof
2016/09/1	2016/09/30	Bing Li	D	South China Univ. of Tech.	China	Prof
2016/09/5	2016/12/22	Frances Y. Kuo	F	University of New South Wales	Australia	Prof
2016/09/5	2016/09/16	Paul Binding	D	University of Calgary	Canada	Prof
2016/09/8	2016/09/13	Masataka Chida	A	Tohoku University	Japan	Prof
2016/09/8	2016/09/13	Wataru Kai	A	Universitat Duisburg-Essen	Germany	PD
2016/09/8	2016/09/13	Yoichi Mieda	A	University of Tokyo	Japan	Prof
2016/09/8	2016/09/13	Kentaro Nakamura	A	Saga University	Japan	Prof
2016/09/8	2016/09/13	Yuji Odaka	A	Kyoto University	Japan	Prof
2016/09/8	2016/09/13	Yoshiyasu Ozeki	A	Kyoto Institute of Technology	Japan	Prof
2016/09/8	2016/09/13	Kanetomo SATO	A	Chuo University	Japan	Prof
2016/09/8	2016/09/13	Shunsuke Yamana	A	Kyoto University	Japan	PhD
2016/09/8	2016/09/13	Shuji Yamamoto	A	Keio University	Japan	Prof
2016/09/8	2016/09/13	Takao Yamazaki	A	Tohoku University	Japan	Prof
2016/09/8	2016/09/13	Ren-He Su	A	Kyoto University	Japan	Prof
2016/09/11	2016/09/23	Shigeki Akiyama	D	University of Tsukuba	Japan	Prof
2016/09/18	2016/09/30	Xuan Thinh Duong	H	Macquarie University	Australia	Prof
2016/09/22	2016/09/26	Martin Guest	C	Waseda University	Japan	Prof
2016/09/30	2016/10/9	Lingbing He	D	Tsinghua University	China	Prof
2016/10/1	2016/11/30	Yuji Tanaka	C	Nagoya University	Japan	PD
2016/10/2	2017/01/24	Khai Ching Ng	F	Universiti Tenaga Nasional	Malaysia	Prof
2016/10/5	2016/10/17	Tu Nguyen	D	Vietnam Acad. of Sci. and Tech.	Vietnam	Prof
2016/10/11	2016/10/18	Danielle Hilhorst	D	Universite Paris-Sud	France	Prof
2016/10/19	2016/10/31	Masato Hashizume	D	Osaka City University	Japan	PhD
2016/10/24	2016/11/19	Albert Fannjiang	E	University of California, Davis	USA	Prof
2016/10/29	2016/11/6	Sergey Gavrilyuk	F	Aix-Marseille University	France	Prof
2016/10/29	2016/11/6	Boniface Nkonga	E	Universite Nice Sophia Antipolis	France	Prof
2016/11/3	2016/11/14	Dirk Nuyens	E	K. U. Leuven	Belgium	Prof
2016/11/4	2016/11/7	Hongyu Liu	D	Hong Kong Baptist University	Hong Kong	Prof
2016/11/4	2016/11/6	Eric Chung	E	CUHK	Hong Kong	Prof
2016/11/5	2016/11/6	Jun-Yong EOM	D	Inha University	Korea	PhD
2016/11/5	2016/11/6	Hiromichi Itou	D	Tokyo University of Science	Japan	Prof
2016/11/5	2016/11/6	Atsushi Kawamoto	D	University of Tokyo	Japan	PhD
2016/11/5	2016/11/6	Xiaofei Li	D	Inha University	Korea	PhD
2016/11/5	2016/11/6	Yikan Liu	D	University of Tokyo	Japan	PhD
2016/11/5	2016/11/6	Hisashi MORIOKA	D	Shibaura Institute of Technology	Japan	PhD
2016/11/5	2016/11/6	Yuliang Wang	D	Hong Kong Baptist University	Hong Kong	Prof
2016/11/5	2016/11/6	Haibing Wang	D	Southeast University	China	Prof
2016/11/5	2016/11/6	Jing-Ni Xiao	D	Hong Kong Baptist University	Hong Kong	PhD
2016/11/5	2016/11/6	Xiang Xu	D	Zhejiang University	China	Prof
2016/11/5	2016/11/6	Jiaqing Yang	D	Xi'an Jiaotong University	China	Prof
2016/11/5	2016/11/6	Sang Hyeon Yu	D	ETH Zurich	Switzerland	PhD
2016/11/5	2016/11/6	Hai Zhang	D	HKUST	Hong Kong	Prof
2016/11/5	2016/11/6	Hongyu Liu	D	Hong Kong Baptist University	Hong Kong	Prof
2016/11/5	2016/11/6	Bo Zhang	D	Chinese Academy of Sciences	China	Prof
2016/11/5	2016/11/6	Gunther Uhlmann	D	University of Washington	USA	Prof

2016/11/5	2016/11/6	Jun Zou	D	The Chinese Univ. of Hong Kong	Hong Kong	Prof
2016/11/7	2016/11/17	Young-Jun Choi	B	Universite Grenoble Alpes	France	PD
2016/11/9	2016/11/19	Peter Kritzer	E	Johann Radon Institute	Austria	Prof
2016/11/10	2016/12/3	Chuulian Terng	C	University of California, Irvine	USA	Prof
2016/11/12	2016/12/1	Ansgar Jungel	F	Vienna University of Technology	Austria	Prof
2016/11/13	2016/11/26	Chen Jiang	B	University of Tokyo	Japan	Prof
2016/11/15	2017/02/15	Inchi Hu	G	HKUST	Hong Kong	Prof
2016/11/18	2016/11/19	Francois Hamel	D	Aix-Marseille University	France	Prof
2016/11/18	2016/11/19	Bei Hu	D	University of Notre Dame	USA	Prof
2016/11/18	2016/11/19	Hiroshi Matano	D	University of Tokyo	Japan	Prof
2016/11/18	2016/11/19	Masayasu Mimura	D	Musashino University	Japan	Prof
2016/11/18	2016/11/19	Philippe Souplet	D	Universite Paris 13	France	Prof
2016/11/18	2016/11/19	Hirokazu Ninomiya	F	Meiji University	Japan	Prof
2016/11/18	2016/11/19	Yoshihisa Morita	D	Ryukoku University	Japan	Prof
2016/11/18	2016/11/19	Shoji Yotsutani	D	Ryukoku University	Japan	Prof
2016/11/18	2016/11/19	Xinfu Chen	D	University of Pittsburgh	USA	Prof
2016/12/1	2016/12/9	Xiongtao Zhang	D	Seoul National University	Korea	PD
2016/12/1	2016/12/4	Eliot Fried	C	Okinawa Inst. of Sci. and Tech.	Japan	Prof
2016/12/1	2016/12/4	Amy Shen	C	Okinawa Inst. of Sci. and Tech.	Japan	Prof
2016/12/4	2016/12/18	Weng Kee Wong	G	Univ. of California, Los Angeles	USA	Prof
2016/12/6	2017/05/30	Kian Chuan Ong	E	University of Nottingham	UK	PhD
2016/12/7	2016/12/9	Seung-Yeal Ha	D	Seoul National University	Korea	Prof
2016/12/8	2016/12/18	Robert S. Eisenberg	F	Rush University	USA	Prof
2016/12/8	2017/01/7	Richard Schoen	C	Stanford University	USA	Prof
2016/12/8	2016/12/9	Martin Li	C	The Chinese Univ. of Hong Kong	Hong Kong	Prof
2016/12/9	2016/12/12	Mu-Tao Wang	C	Columbia University	USA	Prof
2016/12/10	2017/01/8	Anatol N. Kirillov	D	RIMS	Japan	Prof
2016/12/10	2017/01/7	Jifa Jiang	H	Shanghai Normal University	China	Prof
2016/12/11	2016/12/19	Ian Sloan	E	University of New South Wales	Australia	Prof
2016/12/11	2016/12/13	Conan N.C. Leung	C	CUHK	Hong Kong	Prof
2016/12/12	2017/01/7	Nikolaos Zygouras	D	University of Warwick	UK	Prof
2016/12/13	2016/12/17	Lawrence Ein	B	University of Illinois at Chicago	USA	Prof
2016/12/13	2017/01/4	Hau-Tieng Wu	E	University of Toronto	Canada	Prof
2016/12/14	2016/12/22	Burt Totaro	B	Univ. of California, Los Angeles	USA	Prof
2016/12/14	2016/12/22	Ronald Cools	E	K. U. Leuven	Belgium	Prof
2016/12/14	2016/12/23	Ivan Graham	E	University of Bath	UK	Prof
2016/12/14	2016/12/21	Shuwang Li	F	Illinois Institute of Technology	USA	Prof
2016/12/15	2016/12/21	Xiaofan Li	F	Illinois Institute of Technology	USA	Prof
2016/12/17	2016/12/24	Hajime Koba	F	Osaka University	Japan	Prof
2016/12/17	2016/12/19	Chun Liu	F	Pennsylvania State University	USA	Prof
2016/12/17	2016/12/24	Zhilin Li	F	North Carolina State University	USA	Prof
2016/12/18	2016/12/19	Michael Miksis	F	Northwestern University	USA	Prof
2016/12/18	2016/12/19	Chaouqi Misbah	F	Universite Joseph-Fourier	France	Prof
2016/12/18	2016/12/19	Xiaofan Li	F	Illinois Institute of Technology	USA	Prof
2016/12/18	2016/12/19	Shuwang Li	F	Illinois Institute of Technology	USA	Prof
2016/12/18	2016/12/19	Zhilin Li	F	North Carolina State University	USA	Prof
2016/12/18	2016/12/19	Yuan-Nan Young	F	New Jersey Institute of Tech.	USA	Prof
2016/12/18	2016/12/19	Yoichiro Mori	F	University of Minnesota	USA	Prof
2016/12/18	2016/12/19	Qi Wang	F	CSRC, Nankai University	China	Prof
2016/12/18	2016/12/19	Xiu Ye	F	University of Arkansas	USA	Prof
2016/12/18	2016/12/23	Sheng-Chi Liu	A	Washington State University	USA	Prof
2016/12/18	2016/12/23	Xueying Wang	F	Washington State University	USA	Prof
2016/12/19	2016/12/25	Takuya Yamauchi	A	Tohoku University	Japan	Prof
2016/12/21	2017/01/4	Yen-Hsi Richard Tsai	D	University of Texas at Austin	USA	Prof
2016/12/22	2016/12/31	Thomas Yizhao Hou	E	California Institute of Technology	USA	Prof

2016/12/24	2017/01/9	I-Kun Chen	D	Kyoto University	Japan	PD
2016/12/25	2016/12/29	Jaigyoung Choe	C	KIAS	Korea	Prof
2016/12/25	2016/12/29	Man Shun John Ma	C	University of British Columbia	Canada	PhD
2016/12/26	2017/01/8	Jiaping Wang	C	University of Minnesota	USA	Prof
2016/12/26	2017/01/5	Jason Lo	B	UIUC	USA	Prof
2016/12/26	2016/12/30	Shing-Tung Yau	C	Harvard University	USA	Prof
2016/12/27	2017/1/4	Horng-Tzer Yau	D	Harvard University	USA	Prof
2016/12/27	2016/12/29	Helene Esnault	B	Freie Universitat Berlin	Germany	Prof
2016/12/27	2016/12/30	Shigefumi Mori	B	RIMS	Japan	Prof
2016/12/28	2017/01/3	Hojoo Lee	C	KIAS	Korea	Prof
2016/12/29	2017/01/2	Frederick Fong	C	HKUST	Hong Kong	Prof
2016/12/29	2017/01/2	Yen-Chang Huang	C	Xiamen University	Malaysia	Prof
2016/12/29	2017/01/2	Conan N.C. Leung	C	CUHK	Hong Kong	Prof
2016/12/29	2017/01/6	Sumio Yamada	A	Gakushuin University	Japan	Prof
2016/12/30	2017/01/1	Martin Li	C	CUHK	Hong Kong	Prof
2016/12/31	2017/01/9	Shouhong Wang	D	Indiana University	USA	Prof

11.5.3 List of 2017 Visitors

Arr.Date	Dep.Date	Name	Gp.	Affiliation	Country	Title
2017/1/1	2017/12/31	Kazuo Aoki	D	Kyoto University	Japan	Prof
2017/1/1	2017/1/31	Khai Ching Ng	F	Universiti Tenaga Nasional	Malaysia	PD
2017/1/1	2017/2/28	Junfeng He	F	Capital Normal University	China	PhD
2017/1/3	2017/1/8	Ovidiu Munteanu	C	University of Connecticut	USA	Prof
2017/1/3	2017/1/13	Blair Davey	D	The City College of New York	USA	Prof
2017/1/3	2017/1/16	Simone Furini	F	University of Siena	Italy	Prof
2017/1/6	2017/1/18	Nicola Fusco	C	University of Naples	Italy	Prof
2017/1/11	2017/1/21	Giulio Giusteri	C	Okinawa Inst. of Sci. and Tech.	Japan	PD
2017/1/12	2017/1/25	Vincent Giovangigli	C	Centre de Math. Appliquees	France	Prof
2017/1/13	2017/1/18	Chuanju Xu	D	Xiamen University	China	Prof
2017/1/16	2017/2/16	Feng-Bin Wang	F	Chang Gung University	Taiwan	Prof
2017/2/1	2017/2/28	Yen-Chang Huang	C	Xiamen University	Malaysia	Prof
2017/2/1	2017/2/20	Gaohua Tang	A	Guangxi Teachers Edu. Univ.	China	Prof
2017/2/6	2017/3/18	Eric Chu	E	Monash University	Australia	Prof
2017/2/14	2017/2/24	Misun Min	F	Argonne National Laboratory	USA	Prof
2017/2/15	2017/5/9	Loring Tu	B	Tufts University	USA	Prof
2017/2/19	2017/3/20	Sombuddha Bhattacharyya	D	TIFR	India	Prof
2017/2/20	2017/2/25	Kengo Nakajima	E	University of Tokyo	Japan	Prof
2017/2/21	2017/2/25	Takahiro Katagiri	E	Nagoya University	Japan	Prof
2017/3/2	2017/3/28	Marc Thiriet	F	Universite Pierre et Marie Curie	France	Prof
2017/3/3	2017/3/12	Eemeli Blasten	D	HKUST	Hong Kong	PD
2017/3/3	2017/3/12	Leo Tzou	D	The University of Sydney	Australia	Prof
2017/3/4	2017/3/8	Panki Kim	D	Seoul National University	Korea	Prof
2017/3/4	2017/3/10	Akira Sakai	D	Hokkaido University	Japan	Prof
2017/3/5	2017/3/9	Yuki Chino	D	Hokkaido University	Japan	PD
2017/3/5	2017/3/8	Kenkichi Tsunoda	D	Kysuhu University	Japan	PD
2017/3/5	2017/3/8	Jesse Goodman	D	University of Auckland	New Zealand	Prof
2017/3/5	2017/3/18	Yohsuke Imagi	C	IPMU	Japan	PD
2017/3/6	2017/3/9	Ryoki Fukushima	D	RIMS	Japan	Prof
2017/3/6	2017/4/2	Yongsheng Han	H	Auburn University	USA	Prof
2017/3/8	2017/3/25	Yujiro Kawamata	B	University of Tokyo	Japan	Prof
2017/3/11	2017/4/2	Martin Guest	C	Waseda University	Japan	Prof
2017/3/16	2017/3/18	Fang Chen	G	SAS Institute Inc.	USA	Prof
2017/3/21	2017/3/25	Keisuke Arai	A	Tokyo Denki University	Japan	Prof
2017/3/25	2017/4/1	Jian-Feng Cai	E	HKUST	Hong Kong	Prof
2017/3/29	2017/6/1	W. Dale Brownawell	A	Pennsylvania State Univ.	USA	Prof
2017/3/30	2017/4/5	Stephan Luckhaus	D	Leipzig University	Germany	Prof
2017/4/5	2017/4/22	Viktor Ginzburg	C	Univ. of California, Santa Cruz	USA	Prof
2017/4/9	2017/4/22	Yoichiro Mori	F	University of Minnesota	USA	Prof
2017/4/11	2017/4/16	Roberto Svaldi	B	University of Cambridge	UK	PD
2017/4/11	2017/4/17	Stefano Filipazzi	B	University of Utah	USA	PD
2017/4/11	2017/4/17	Iacopo Brivio	B	Univ. of California, San Diego	USA	PD
2017/4/11	2017/4/17	Joe Waldron	B	Ecole Polytech. Fed. Lausanne	France	Prof
2017/4/12	2017/4/30	Jeffrey Carlson	B	University of Toronto	Canada	PD
2017/4/12	2017/4/17	Jinsong Xu	B	Xian Jiaotong Liverpool Univ.	China	Prof
2017/4/12	2017/4/16	Florin Ambro	B	IMAR	Romania	Prof
2017/4/12	2017/4/17	Osamu Fujino	B	Osaka University	Japan	Prof
2017/4/12	2017/4/17	Caucher Birkar	B	University of Cambridge	UK	Prof
2017/4/12	2017/4/17	Jingjun Han	B	Beijing University	China	PD
2017/4/12	2017/4/17	Zhan Li	B	BICMR/Beijing University	China	PD
2017/4/12	2017/4/17	Haidong Liu	B	Kyoto University	Japan	PD
2017/4/12	2017/4/17	Sung Rak Choi	B	Yonsei University	Korea	Prof
2017/4/12	2017/4/17	Jinhyung Park	B	KIAS	Korea	PD
2017/4/12	2017/4/17	Joonyeong Won	B	Institute of Basic Science	Korea	PD

2017/4/12	2017/4/17	Ivan Fesenko	B	The University of Nottingham	UK	Prof
2017/4/12	2017/4/17	Taro Sano	B	Kobe University	Japan	Prof
2017/4/12	2017/4/17	Kenta Hashizume	B	Kyoto University	Japan	PD
2017/4/12	2017/4/17	Chen Jiang	B	Tokyo University	Japan	PD
2017/4/12	2017/4/17	Wei Chung Chen	B	Tokyo University	Japan	PhD
2017/4/13	2017/4/16	Yifei Chen	B	CAS, Beijing	China	Prof
2017/4/13	2017/4/17	Yusuke Nakamura	B	Tokyo University	Japan	Prof
2017/4/14	2017/4/17	Yoshinori Gongyo	B	The University of Tokyo	Japan	Prof
2017/4/19	2017/5/5	Atsushi Mochizuki	F	Inst. Phys. and Chem. Res.	Japan	Prof
2017/4/20	2017/4/29	Eiji Yanagida	D	Tokyo Institute of Technology	Japan	Prof
2017/4/28	2017/5/7	Moody T. Chu	E	North Carolina State University	USA	Prof
2017/5/2	2017/5/8	Mu-Tao Wang	C	Columbia University	USA	Prof
2017/5/3	2017/5/10	Maria J. Esteban	F	Universite Paris-Dauphine	France	Prof
2017/5/5	2017/5/7	Raymond Honfu Chan	E	CUHK	Hong Kong	Prof
2017/5/6	2017/5/17	Arnd Scheel	D	University of Minnesota	USA	Prof
2017/5/10	2017/5/20	Wenjia Jing	D	Tsinghua University	China	Prof
2017/5/11	2017/6/9	Hau-Tieng Wu	E	University of Toronto	Canada	Prof
2017/5/14	2017/5/29	Zheng Zhang	D	Remin University of China	China	Prof
2017/5/16	2017/5/25	Der-Chen Chang	H	Georgetown University	USA	Prof
2017/5/19	2017/5/30	Wolfgang Schulze	H	Potsdam University	Germany	Prof
2017/5/20	2017/5/26	Wei Wang	H	Zhejiang University	China	Prof
2017/5/20	2017/6/7	Jeng-Eng Lin	H	George Mason University	USA	Prof
2017/5/21	2017/5/27	D. H. Phong	H	Columbia University	USA	Prof
2017/5/22	2017/6/1	Kenro Furutani	H	Tokyo University of Science	Japan	Prof
2017/5/22	2017/5/28	Irina Markina	H	University of Bergen	Norway	Prof
2017/5/22	2017/5/31	Sheng-Ya Feng	H	Fudan University	China	Prof
2017/5/23	2017/7/6	Yen-Hsi Richard Tsai	D	University of Texas at Austin	USA	Prof
2017/5/23	2017/5/28	Tomoki Kawahira	D	Tokyo Institute of Technology	USA	Prof
2017/5/24	2017/6/4	Yunping Jiang	D	The City University of New York	USA	Prof
2017/5/24	2017/6/20	Ian Musson	D	Univ. of Wisconsin, Milwaukee	USA	Prof
2017/5/24	2017/5/27	Huyi Hu	D	Michigan State University	USA	Prof
2017/5/24	2017/5/28	Shin Kiriki	D	Tokai University	Japan	Prof
2017/5/24	2017/5/28	Hiroshige Shiga	D	Tokyo Institute of Technology	Japan	Prof
2017/5/24	2017/5/27	Hiroki Takahasi	D	Keio University	Japan	Prof
2017/5/24	2017/5/28	Masato Tsujii	D	Kyushu University	Japan	Prof
2017/5/24	2017/5/28	Gengrong Zhang	D	Hunan First Normal University	China	Prof
2017/5/24	2017/5/28	Masashi Kisaka	D	Kyoto University	Japan	Prof
2017/5/25	2017/5/28	Kesong Yan	D	Guangxi Univ. Fin. and Econ.	China	Prof
2017/5/26	2017/5/28	Paul E. Sacks	D	Iowa State University	USA	Prof
2017/5/28	2017/6/17	Jiaping Wang	C	University of Minnesota	USA	Prof
2017/5/30	2017/6/5	Conan N. C. Leung	C	CUHK	Hong Kong	Prof
2017/6/1	2017/7/15	Rolf Walder	E	Universite de Lyon	France	Prof
2017/6/6	2017/6/10	Bongsuk Kwon	D	Ulsan Nat'l Inst. Sci. and Tech.	Korea	Prof
2017/6/6	2017/6/10	Chang-Yeol Jung	D	Ulsan Nat'l Inst. Sci. and Tech.	Korea	Prof
2017/6/8	2017/6/19	Loring Tu	B	Tufts University	USA	Prof
2017/6/12	2017/6/29	LieJune Shiau	D	University of Houston	USA	Prof
2017/6/13	2017/6/24	Yujiro Kawamata	B	University of Tokyo	Japan	Prof
2017/6/14	2017/6/27	Albert Fannjiang	E	Univ. of California, Davis	USA	Prof
2017/6/15	2017/6/28	Valery Alexeev	B	University of Georgia	USA	Prof
2017/6/15	2017/6/24	James McKernan	B	UCSD	USA	Prof
2017/6/17	2017/6/30	Mourad E. H. Ismail	D	University of Central Florida	USA	Prof
2017/6/17	2017/7/1	Zhi Jiang	B	Fudan University	China	Prof

2017/6/17	2017/6/23	Karl Schwede	B	The University of Utah	USA	Prof
2017/6/18	2017/6/24	Yusuke Nakamura	B	Tokyo University	Japan	Prof
2017/6/18	2017/6/24	Yongnam Lee	B	KAIST	Korea	Prof
2017/6/18	2017/6/23	Adrian Langer	B	University of Warsaw	Polish	Prof
2017/6/18	2017/7/11	Hengyu Zhou	D	Sun Yat-Sen University	China	PD
2017/6/18	2017/6/24	Baohua Fu	B	Chinese Academy of Sciences	China	Prof
2017/6/18	2017/6/24	Keiji Oguiso	B	Tokyo University	Japan	Prof
2017/6/18	2017/6/24	Shinnosuke Okawa	B	Osaka University	Japan	Prof
2017/6/18	2017/6/24	Jihun Park	B	IBS/POSTECH	Korea	Prof
2017/6/18	2017/6/24	Yuri Prokhorov	B	Steklov Math. Institute	Russia	Prof
2017/6/18	2017/6/24	Hiromu Tanaka	B	Imperial College London	UK	PD
2017/6/18	2017/6/26	Cehngyang Xu	B	BICMR	China	Prof
2017/6/18	2017/6/24	De-Qi Zhang	B	National Univ. of Singapore	Singapore	Prof
2017/6/18	2017/6/24	Wei-Chung Chen	B	The University of Tokyo	Japan	PhD
2017/6/18	2017/6/24	Sho Ejiri	B	The University of Tokyo	Japan	PhD
2017/6/18	2017/6/24	Kenta Hashizume	B	Kyoto University	Japan	PhD
2017/6/18	2017/6/23	Chen Jiang	B	IPMU	Japan	PD
2017/6/18	2017/6/24	Sato Kenta	B	University of Tokyo	Japan	PhD
2017/6/18	2017/6/24	Atsushi Ito	B	Nagoya University	Japan	Prof
2017/6/18	2017/6/24	Katsuhisa Furukawa	B	University of Tokyo	Japan	Prof
2017/6/19	2017/6/26	Stephen S-T. Yau	A	Tsinghua University	China	Prof
2017/6/20	2017/6/22	Yoshinori Gongyo	B	Tokyo University	Japan	Prof
2017/6/20	2017/7/17	Jiun-Chau Wang	H	University of Saskatchewan	Canada	Prof
2017/6/24	2017/7/1	Emilio Acerbi	D	University of Parma, Italy	Italy	Prof
2017/6/25	2017/7/11	Jeffrey Connors	D	University of Connecticut	USA	Prof
2017/6/26	2017/7/3	Masayasu Mimura	D	Meiji University	Japan	Prof
2017/6/27	2017/7/18	Harvard University	A	Harvard University	USA	PhD
2017/6/27	2017/7/7	Chun-Ju Lai	A	Max-Planck Institute for Math.	Germany	PD
2017/6/28	2017/7/4	Jun-ichi Segata	D	Tohoku University	Japan	Prof
2017/6/29	2017/7/2	Yoshihisa Morita	D	Ryukoku University	Japan	Prof
2017/7/1	2017/7/31	Yong Yu	F	CUHK	Hong Kong	Prof
2017/7/1	2017/7/8	Simon Goodwin	A	University of Birmingham	UK	PD
2017/7/1	2017/7/8	Yiqiang Li	A	University at Buffalo	USA	Prof
2017/7/2	2017/7/7	Shunsuke Tsuchioka	A	University of Tokyo	Japan	Prof
2017/7/2	2017/7/7	Euiyong Park	A	University of Seoul	Korea	Prof
2017/7/2	2017/7/22	Kevin Coulembier	A	The University of Sydney	Australia	PD
2017/7/2	2017/7/8	Hideya Watanabe	A	Tokyo Institute of Technology	Japan	PhD
2017/7/2	2017/7/8	Myungho Kim	A	KIAS	Korea	PD
2017/7/2	2017/7/8	Yucai Su	A	Tongji University	China	Prof
2017/7/2	2017/7/8	Jonathan Kujawa	A	University of Oklahoma	USA	Prof
2017/7/2	2017/7/8	Nicholas Davidson	A	University of Oklahoma	USA	PD
2017/7/2	2017/7/8	Inna Entova-Aizenbud	A	Ben Gurion University	USA	PD
2017/7/2	2017/7/8	Jun Hu	A	Beijing Institute of Technology	China	Prof
2017/7/2	2017/7/8	Satoshi Naito	A	Tokyo Institute of Technology	Japan	Prof
2017/7/2	2017/7/8	Jae-Hoon Kwon	A	Seoul National University	Korea	Prof
2017/7/2	2017/7/8	Se-Jin Oh	A	Ewha Womans University	Korea	Prof
2017/7/2	2017/7/9	Weiqiang Wang	A	University of Virginia	USA	Prof
2017/7/2	2017/7/9	Li Luo	A	East China Normal University	China	Prof
2017/7/2	2017/7/9	Sean Ian Clark	A	Northeastern University	USA	PD
2017/7/3	2017/7/8	Kengo Nakajima	E	University of Tokyo	Japan	Prof
2017/7/3	2017/7/8	Tetsuya Hoshino	E	University of Tokyo	Japan	Prof
2017/7/3	2017/7/9	Ivan Chi-Ho Ip	A	Kyoto University	Japan	Prof
2017/7/5	2017/8/17	Michael Tsau	B	Saint Louis University	USA	Prof
2017/7/7	2017/7/29	Daguang Chen	C	Tsinghua University	China	Prof
2017/7/9	2017/7/12	Hiroshi Nishiura	F	Hokkaido University	Japan	Prof
2017/7/9	2017/7/13	Joseph T Wu	F	University of Hong Kong	Hong Kong	Prof
2017/7/9	2017/7/22	Abba Gumel	F	Arizona State University	USA	Prof

2017/7/11	2017/8/10	Gouzheng Cheng	H	Wenzhou University	China	Prof
2017/7/13	2017/7/20	Alex Lubotzky	A	The Hebrew University	Israel	Prof
2017/7/15	2017/8/15	Horng-Tzer Yau	D	Harvard University	USA	Prof
2017/7/15	2017/8/15	Stephen Gourley	F	University of Surrey	UK	Prof
2017/7/16	2017/7/21	Nimalan Arinaminpathy	F	Imperial College London	UK	Prof
2017/7/16	2017/7/21	Francesc Castella	A	Princeton University	USA	Prof
2017/7/17	2017/7/30	Miklos Simonovits	A	Renyi Inst. Math. in Budapest	Hungary	Prof
2017/7/18	2017/7/31	Wei-Hsuan Yu	A	Michigan State University	USA	Prof
2017/7/21	2017/8/20	Sen Zhu	H	Jilin University	China	Prof
2017/7/23	2017/8/18	Chun-Hung Liu	A	Princeton University	USA	PD
2017/7/31	2017/8/20	Xing Liang	F	Univ. Sci. and Tech. of China	China	Prof
2017/8/1	2017/8/31	Bogdan Kazmierczak	F	Polish Academy of Sciences	Poland	Prof
2017/8/13	2017/9/24	Akinari Hoshi	A	Niigata University	Japan	Prof
2017/8/24	2017/9/24	Aiichi Yamasaki	A	Kyoto University	Japan	Prof
2017/9/1	2017/9/30	Richard Schoen	C	Stanford University	USA	Prof
2017/9/4	2017/9/22	Frances Y. Kuo	E	University of New South Wales	Australia	Prof
2017/9/4	2017/9/22	Yoshinori Mishiba	A	Fukuoka Institute of Technology	Japan	Prof
2017/9/17	2017/9/30	Ryotaro Harada	A	Nagoya University	Japan	PhD
2017/9/29	2017/10/13	Albert Fannjiang	E	University of California, Davis	USA	Prof
2017/10/1	2017/10/31	Jiangwei Xue	A	Wuhan University	China	Prof
2017/10/1	2017/12/31	Yuqiang Zheng	A	Wuhan University	China	PhD
2017/10/1	2017/12/31	Qun Li	A	Wuhan University	China	PhD

11.6 Publication data of Key Members

11.6.1 Publication of Visitors Which Acknowledge NCTS

Author	Title	Journal	Year
Hirokazu Ninomiya	Traveling spots on multi-dimensional excitable media	Journal of Elliptic and Parabolic Equations	2015
Hirokazu Ninomiya	Traveling spots on multi-dimensional excitable media	Journal of Elliptic and Parabolic Equations	2015
Hongqiu Chen	Stability of Solitary-Wave Solutions of Systems of Dispersive Equations	Appl. Math. Optim.	2015
Jerry L. Bona	Higher-order Hamiltonian model for undirectional water waves		2015
Jerry L. Bona	Stability of Solitary-Wave Solutions of Systems of Dispersive Equations	Appl. Math. Optim.	2015
Shoji Yotsutani	Exact multiplicity of stationary limiting problems of a cell polarization model	Discrete and Continuous Dynamical Systems	2015
Caucher Birkar	Effetivity of Iitaka Fibrations and Pluricanonical Systems of Polarized Pairs	Pub. Math. IHES	2016
Caucher Birkar	Existence of Flips and Minimal Models for 3-folds in Char P	Annales scienti?ques de lENS 49	2016
Caucher Birkar	Anti-Pluricanonical Systems On Fano Varieties		
Caucher Birkar	Iitaka'S $C_{n,m}$ Conjecture For 3-Folds Over Finite Fields		
Caucher Birkar	Existence Of Mori Fibre Spaces For 3-Folds In Char p		
Daphne Liu	Upper Bounds for the Strong Chromatic Index?of Halin Graphs	Discussiones of Mathematicae Graph Theory	2016
Hongqiu Chen	New Results for the BBM Equation	J. Math. Study	2016
Shoji Yotsutani	Global bifurcation sheet and diagrams of wave-pinning in a reaction-diffusion model for cell polarization	Dynamical Systems, Differential Equations and Applications	2016
Bei Hu	Quenching Rate For A Nonlocal Problem Arising In The Micro-Electro Mechanical System		
Cascini Paolo	Purely Log Terminal Threefolds With Non-Normal Centres In Characteristic Two		
Cascini Paolo	Smooth Rational Surfaces Violating Kawamata-Viehweg Vanishing		
Chun-Hung Liu	Edge Roman Domination on Graphs	Graphs and Combinatorics	
Hojoo Lee	Rigidity Of Hyperspheres In Warped Product Manifolds		
Hongqiu Chen	Well-Posedness For A Higher-Order, Nonlinear, Dispersive Equation On A Quarter Plane		
John Coates	Iwasawa Theory Of Quadratic Twists Of X0(49).		
Kerby Shedden	Optimal Group Testing Designs For Estimating Prevalence With Un-Certain Testing Errors		
Li Tiexiang	A Symmetric Structure-Preserving Fqr Algorithm For Linear Response Eigenvalue Problems		
Masayuki Kawakita	Divisors Computing The Minimal Log Discrepancy On A Smooth Surface		
Yau, Stephen S.T.	On higher dimensional complex Plateau problem	Mathematische Zeitschrift	2015
Yau, Stephen S.T.	Thom-Sebastiani properties of Kohn-Rossi cohomology of compact connected strongly pseudoconvex CR manifolds		2016
Yau, Stephen S.T.	A Sharp Upper Estimate Conjecture for the Yau Number of Weighted Homogeneous Isolated Hypersurface Singularity	PAMQ	2016
Stephen Yau	Kohn-Rossi Cohomology And Nonexistence Of Cr Morphisms Between Compact Strongly Pseudoconvex Cr Manifolds		
Stephen Yau	Negative Weight Derivation And Rational Homotopy Theory		

Author	Title	Journal	Year
Viktor L. Ginzburg	Conley Conjecture Revisited		
Xiaofeng Ren	Bubbles And Droplets In A Singular Limit Of The Fitzhugh-Nagumo System		
Yu Jin	The Dynamics Of A Fish-Bird System In A Lake Environment		
Yu Jin	A Benthic-Drift Model For Two Competitive Species		

11.6.2 Publication of NCTS Postdoc Fellow

Author	Title	Journal	Year
Chih-Wei Chen	Structure at infinity of expanding gradient Ricci soliton	Asian Journal of Mathematics	2015
Chih-Wei Chen	On three-dimensional CR Yamabe solitons	Journal of Geometric Analysis	2016
Chih-Wei Chen	On the CR analogue of Reilly formula and Yau eigenvalue conjecture	Asian Journal of Mathematics	2016
Chih-Wei Chen	A note on geodesic loops in complete non-compact Ricci solitons	Acta Mathematica Scientia	to appear
Chih-Wei Chen	Shi-type estimates along the Ricci flow based on Ricci curvature		preprint
Chih-Whi Chen	Finite-dimensional representations of periplectic Lie superalgebras	Journal of Algebra	2015
Chih-Whi Chen	Affne periplectic Brauer algebras		2016
Chih-Whi Chen	Reduction method for representations of queer Lie superalgebras	Journal of Mathematical Physics	2016
Chih-Whi Chen	Quantum group of type A and representations of queer Lie superalgebra	Journal of Algebra	2017
Jia-Rui Fei	General presentations of algebras	Adv. Math.	2015
Jia-Rui Fei	Constructing coherently G-invariant modules	J. Algebra	2016
Jia-Rui Fei	Cluster algebras and semi-invariant rings II. Projections	Math. Z.	2016
Jia-Rui Fei	Counting using Hall algebra II. Extensions from quivers	Algebr. Represent. Theory	2015
Jia-Rui Fei	On some quiver determinantal varieties	J. Algebra	2015
Chi-Kwong Fok	KR-theory of compact Lie groups with group anti-involutions	Topology and its Applications	2016
Chi-Kwong Fok	Picard group of isotropic realizations of twisted Poisson manifolds	Journal of Geometric Mechanics	2016
Chi-Kwong Fok	Adams operations on classical compact Lie groups	Proceedings of the American Mathematical Society	2016
Dang Tuan Hiep	Rational curves on Calabi-Yau threefolds: verifying mirror symmetry predictions	J. Symbolic Comput.	2016
Dang Tuan Hiep	On the degree of Fano schemes of linear subspaces on hypersurfaces	Kodai Math. J.?	2016
Dang Tuan Hiep	A formula for the algebraic degree in semidefinite programming	Kodai Math. J.	2016
Yu-Tat Ho	Blob-Based Super-Resolution Sinogram for PET Image Reconstruction	Taiwanese Symposium on Molecular Imaging	2015
Zheng-yu Hu	Valuations and log canonical thresholds	Pure and Applied Mathematics Quarterly	2015
Chien-Hao Huang	On the speed of the one-dimensional polymer in the large range regime	Statistics and Probability Letters.	2016

Author	Title	Journal	Year
Gyeongha Hwang	On the finite time blowup for Hartree equations	Proc. Royal Soc. Edinb	2015
Gyeongha Hwang	Energy concentration of the focusing energy-critical Fnls	Journal of Mathematical Analysis and Applications	2016
Gyeongha Hwang	On small data scattering or hartree equations with short-range interaction	Communications on Pure and Applied Analysis	2016
Hiep Dang	A formula for the algebraic degree in semide nite programming	Kodai Math. J.	2016
Hiep Dang	Rational curves on Calabi-Yau threefolds: Verifying mirror symmetry predictions	J. Symbolic Comput.	2016
Hiep Dang	On the degree of Fano schemes of linear subspaces on hypersurfaces	Kodai Math. J.	2016
Hiep Dang	Well-posedness for a higher-order, nonlinear, dispersive equation on a quarter plane		preprint
Hiep Dang	The dynamics of a fish-bird system in a lake environment		preprint
Hiep Dang	A Benthic-Drift Model for Two Competitive Species		preprint
Hiep Dang	Divisors computing the minimal log discrepancy on a smooth surface		preprint
Hiep Dang	Bubbles and droplets in a singular limit of the FitzHugh-Nagumo system		preprint
Yunchang Seol	An immersed boundary method for simulating vesicle dynamics in three dimensions	Journal of Computational Physics	2016
Yunchang Seol	Vesicle electrohydrodynamic simulations by coupling immersed boundary and immersed interface method	Journal of Computational Physics	2016
Tien-Tsan Shieh	On a new class of fractional partial differential equations	Adv. Calc. Var.	2015
Tien-Tsan Shieh	L p -theory for fractional gradient PDE with VMO coefficients	Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl.	2015
Tien-Tsan Shieh	From gradient theory of phase transition to a minimal interface problem with a boundary contact energy	Discrete Contin. Dyn. Syst.	2016
Tien-Tsan Shieh	Conley Conjecture Revisited		preprint
Yong-Jie Wang	Simple Harish-Chandra modules over the super Schrodinger algerba in (1 + 1) dimensional spacetime	Journal of Mathematical physics .	2014
Yong-Jie Wang	Color cyclic homology and Steinberg Lie color algebra	Front. Math. China	2015
Yong-Jie Wang	A family of representations of the Lie superalgebra gldm—n(Cq)	Journal of Algebra	2015
Yong-Jie Wang	Simple Harish-Chandra supermodules over the super Schrodinger algerba	Sci. China Math	2016
Yong-Jie Wang	The Steinbery Lie algebra st2(S)	Algebra Colloquium	2016
Yong-Jie Wang	Central extensions of generalized orthosymplectic Lie superalgebras	Sci. China Math	2017
Yong-Jie Wang	A family of representations of the general linear affine Lie superalgebra gldm—n(C[t, t?1])	Journal of Algebra	to appear

11.6.3 Publication of Key Members

Author	Title	Journal	Ack	AFF	Year
Ban, Jung-Chao	On the structure of multi-layer cellular neural networks	J. Differential Equations	Y		2012
Ban, Jung-Chao	Inhomogeneous lattice dynamical systems and the boundary effect	Boundary Value Problems	Y		2013
Ban, Jung-Chao	The Learning Problem of Multi-layer?Neural?Networks	Neural Networks	Y		2013
Ban, Jung-Chao	Diamond in multi-layer cellular neural networks	Applied Math. Computation	Y		2013
Ban, Jung-Chao	On the qualitative behavior of linear cellular automata	Journal of Cellular Automata	Y		2013
Ban, Jung-Chao	Layer effect on multi-layer cellular neural networks	Appl. Math. Lett.	Y		2013
Ban, Jung-Chao	Zeta functions for two-dimensional shifts of finite type	Memoirs of the Amer. Math. Soc.	Y		2013
Ban, Jung-Chao	On the structure of two-layer cellular neural networks	Differential & Difference Equations and Applications			2013
Ban, Jung-Chao	The spatial complexity of inhomogeneous multi-layer neural networks	Neural Processing Letters	Y		2014
Ban, Jung-Chao	The multifractal spectra for the recurrence rates of beta-transformations	J. Math. Anal. Appl	Y		2014
Ban, Jung-Chao	Neural networks equations and symbolic dynamics	Int. J. Mach. Learn. & Cyber	Y		2014
Ban, Jung-Chao	Dimension Spectrum for Sofic Systems	Adv. Math. Phys			2014
Ban, Jung-Chao	Tracking mean field dynamics by synchronous computations of recurrent multilayer perceptrons	Computational and Numerical Simulations			2014
Ban, Jung-Chao	On the structure of multi-layer cellular neural networks: complexity between two layers	Complex Systems	Y		2015
Ban, Jung-Chao	Realization problem of multi-layer cellular neural networks	Neural Networks	Y		2015
Ban, Jung-Chao	Solution Structure of Multi-layer Neural Networks with Initial Condition	J. Dynamics. Differential Equation	Y		2015
Ban, Jung-Chao	Tree-shifts: Irreducibility, mixing, and the chaos of tree-shifts	Trans. Amer. Math. Soc	Y		2016
Ban, Jung-Chao	When are two multi-layer cellular neural networks the same	Neural Networks	Y		2016
Ban, Jung-Chao	Tree-shifts: Irreducibility, mixing, and the chaos of tree-shifts	Trans Amer. Math. Soc	Y		2016
Chang, Chieh-Yu	Algebraic independence of periods and logarithms of Drinfeld modules	Journal of the American Mathematical Society	Y	Y	2012
Chang, Chieh-Yu	Special values of Drinfeld modular forms and algebraic independence	Mathematische Annalen	Y	Y	2012
Chang, Chieh-Yu	Transcendence of special values of quasi-modular forms	Forum Mathematicum	Y	Y	2012
Chang, Chieh-Yu	Algebraic independence of periods and logarithms of Drinfeld modules. With an appendix by B. Conrad	Journal of the American Mathematical Society	Y	Y	2012
Chang, Chieh-Yu	Special values of Drinfeld modular forms and algebraic independence	Mathematische Annalen	Y	Y	2012
Chang, Chieh-Yu	ranscendence of special values of quasi-modular forms	Forum Mathematicum	Y	Y	2012
Chang, Chieh-Yu	On periods of the third kind for rank two Drinfeld module	Mathematische Zeitschrift	Y	Y	2013
Chang, Chieh-Yu	On periods of the third kind for rank two Drinfeld module	Mathematische Zeitschrift	Y	Y	2013
Chang, Chieh-Yu	Linear independence of monomials of multizeta values in positive characteristic	Compositio Mathematica	Y	Y	2014
Chang, Chieh-Yu	Linear independence of monomials of multizeta values in positive characteristic	Compositio Mathematica	Y	Y	2014
Chang, Chieh-Yu	An effective criterion for Eulerian multizeta values in positive characteristic	Journal of the European Mathematical Society	Y		2016
Chang, Chieh-Yu	Linear relations among double zeta values in positive characteristic	Cambridge Journal of Mathematics	Y		2016

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Chang, Chieh-Yu	Papanikolas and J. Yu, An effective criterion for Eulerian multi-zeta values in positive characteristic		Y		2016
Chang, Chieh-Yu	Linear relations among double zeta values in positive characteristic	Cambridge Journal of Mathematics	Y		2016
Chang, Gerard Jennhwa	Complexity of distance paired-domination problem in graphs	Theor. Compt. Sci.		Y	2012
Chang, Gerard Jennhwa	Strong edge-coloring for cubic Halin graphs	Discrete Math.		Y	2012
Chang, Gerard Jennhwa	Balanced k-decompositions of graphs	Discrete Appl. Math.		Y	2012
Chang, Gerard Jennhwa	A characterization of graphs with rank 5	Linear Algebra Appl.		Y	2012
Chang, Gerard Jennhwa	First-fit chromatic numbers of d-degenerate graphs	Discrete Math.		Y	2012
Chang, Gerard Jennhwa	Upper k-tuple domination in graphs	Discrete Math. Theor. Comput. Sci.		Y	2012
Chang, Gerard Jennhwa	Parity and strong parity edge-colorings of graphs	J. Combin. Optim.		Y	2012
Chang, Gerard Jennhwa	(? + 1)-total choosability of planar graphs with no cycles of length from 4 to k and without close triangles	Discrete Math.		Y	2012
Chang, Gerard Jennhwa	The Hamiltonian numbers of MLobius double loop networks	J. Combin. Optim.		Y	2012
Chang, Gerard Jennhwa	Generalized power domination of graphs	Discrete Appl. Math.		Y	2012
Chang, Gerard Jennhwa	Competition numbers of complete r-partite graphs	Discrete Appl. Math.		Y	2012
Chang, Gerard Jennhwa	Upper bounds on Roman domination numbers of graphs	Discrete Math.		Y	2012
Chang, Gerard Jennhwa	Equitable colorings of Cartesian products of graphs	Discrete Appl. Math.		Y	2012
Chang, Gerard Jennhwa	The competition number of a graph with exactly two holes	J. Combin. Optim.		Y	2012
Chang, Gerard Jennhwa	Roman domination on 2-connected graphs	SIAM J. Discrete Math.		Y	2012
Chang, Gerard Jennhwa	Algorithmic aspects of k-domination in graphs	Discrete Appl. Math		Y	2013
Chang, Gerard Jennhwa	A short poof for Chens Alternative Kneser Colouring Lemma	J. Combin. Theory		Y	2013
Chang, Gerard Jennhwa	On mixed domination problem in graphs	Theor. Comput. Sci.		Y	2013
Chang, Gerard Jennhwa	Algorithmic aspect of stratified domination in graphs	Inform. Process. Letters		Y	2013
Chang, Gerard Jennhwa	b-coloring of tight bipartite graphs and the Erd?os-FaberLovasz Conjecture	Discrete Appl. Math.		Y	2013
Chang, Gerard Jennhwa	On a conjecture on the balanced decomposition number	Dircete Math.		Y	2013
Chang, Gerard Jennhwa	Strong chromatic index of 2-degenerate graphs	J. Graph Theory		Y	2013
Chang, Gerard Jennhwa	Algorithmic aspects of domination in graphs	Handbook of Combinatorial Optimization		Y	2013
Chang, Gerard Jennhwa	Rainbow domination and related problems on strongly chordal graphs	Discrete Appl. Math.		Y	2013
Chang, Gerard Jennhwa	b-chromatic numbers of powers of paths and cycles	Discrete Appl. Math.		Y	2013

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Chang, Gerard Jennhwa	Roman domination on strongly chordal graphs	J. Combin. Optim.		Y	2013
Chang, Gerard Jennhwa	A linear-time algorithm for finding locally connected spanning trees on circular-arc graphs	Algoritmica		Y	2013
Chang, Gerard Jennhwa	Counterexamples to an edge spread problem on zero forcing number	Linear Algebra Appl		Y	2014
Chang, Gerard Jennhwa	On the algorithmic complexity of k-tuple total domination	Discrete Appl. Math		Y	2014
Chang, Gerard Jennhwa	The linear guessing number of undirected graphs	Linear Algebra Appl		Y	2014
Chang, Gerard Jennhwa	Graphs with small balanced decomposition numbers	J. Combin. Optim		Y	2014
Chang, Gerard Jennhwa	Strong chromatic index of planar graphs with large girth	Discussiones Mathematicae Graph Theory		Y	2014
Chang, Gerard Jennhwa	Bandwidth sums of block graphs and cacti	J. Combin. Optim		Y	2014
Chang, Gerard Jennhwa	Dot product dimensions of graphs	Discrete Appl. Math		Y	2014
Chang, Gerard Jennhwa	Strong edge-coloring of jellyfish graphs	Discrete Math		Y	2015
Chang, Gerard Jennhwa	The number of steps and the final configuration of relaxation procedures on graphs	Discrete Appl. Math		Y	2015
Chang, Gerard Jennhwa	On the k-power domination of hypergraphs	J. Combin. Optim		Y	2015
Chang, Gerard Jennhwa	From edge-coloring to strong edge-coloring	Elec. J. Comb		Y	2015
Chang, Gerard Jennhwa	Edge Roman domination on graphs	Graph Comnbin		Y	2016
Chang, Gerard Jennhwa	Max-coloring of vertex-weighted graphs	Graph and Combin		Y	2016
Chang, Gerard Jennhwa	Steinbergs Conjecture and near-colorings			Y	preprint
Chao-Nien Chen	Standing pulse solutions to FitzHugh-Nagumo equations	Arch. Rat. Mech. Anal.			2012
Chao-Nien Chen	Stability analysis for standing pulse solutions to FitzHughV-Nagumo equations	Calc. Var. PDE			2014
Chao-Nien Chen	Planar Standing Wavefronts in the FitzHugh-Nagumo Equations	SIAM J. Math. Anal.			2014
Chao-Nien Chen	A variational approach for standing waves of FitzHugh-Nagumo type systems	J. Differential Equations			2014
Chao-Nien Chen	Connecting orbits for subharmonic solutions in time reversible Hamiltonian systems	Bull. Inst. Math., Academia Sinica (New Series), Special issue in honor of Neil Trudinger			2014
Chao-Nien Chen	Traveling pulse solutions to FitzHugh-Nagumo equations	Calc. Var. PDE			2015
Chao-Nien Chen	Spectral comparison and gradient-like property in the FitzHugh-Nagumo type equations	Nonlinearity			2015
Chao-Nien Chen	Traveling waves for the FitzHugh-Nagumo system on an infinite channel	J. Differential Equations			2016
Chen, Chiun-Chuan	Exact Traveling Wave Solutions of Three Species Competition-Diffusion Systems	Discrete and Cont. Dyn. Sys.-B			2012
Chen, Chiun-Chuan	Simple PDE model of spot replication in any dimension	SIAM J. Math. Anal.			2012
Chen, Chiun-Chuan	Travelling wave solutions of a free boundary problem for a 2-species competition model	Commun. Pure Appl. Anal.			2013

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Chen, Chiun-Chuan	Semi-exact equilibrium solutions for three-species competition-diffusion systems	Hiroshima Math. J.			2013
Chen, Chiun-Chuan	Mean field equation of Liouville type with singular data topological degree	Comm. Pure Appl. Math.			2015
Chen, Chiun-Chuan	Traveling waves for the FitzHugh-Nagumo system on an infinite channel	J. Differential Equations			2015
Chen, Chiun-Chuan	Nonexistence of traveling wave solutions, exact and semi-exact traveling wave solutions for diffusive Lotka-Volterra systems of three competing species	Commun. Pure Appl. Anal.			2015
Chen, Chiun-Chuan	A maximum principle for diffusive LotkaVVolterra systems of two competing species	J. Differential Equations			2016
Chen, Jungkai	Varieties with Vanishing Holomorphic Euler Characteristic	Jour. Reine Angew. Math.	Y	Y	2014
Chen, Jungkai	Factoring Threefold Divisorial Contractions to Points	Ann. Scuola Norm. Sup. Pisa	Y	Y	2014
Chen, Jungkai	Explicit Birational Geometry of 3-Folds and 4-Folds of General Type, III	Comp. Math	Y	Y	2015
Chen, Jungkai	Birational Maps of 3-Folds	Taiwanese Jour. Math.	Y	Y	2015
Chen, Jungkai	The Noether Inequality for Gorenstein Minimal 3-Folds	Comm. Anal. Geom	Y	Y	2015
Chen, Jungkai	Varieties Fibered Over Abelian Varieties with Fibers of Log General Type	Adv. Math.	Y	Y	2015
Chen, Jungkai	Positivity in Variety of Maximal Albanese Dimension	Jour. Reine Angew. Math.	Y	Y	2016
Chen, Jungkai	Irregular Varieties with Geometric Genus One, Theta Divisors, and Fake Tori	Preprints	Y	Y	2016
Chen, Lung-Chi	Ice model and eight-vertex model on the two-dimensional Sierpinski gasket	Physica A			2013
Chen, Lung-Chi	Asymptotic enumeration of independent sets on the Sierpinski gaske	Flomat			2013
Chen, Lung-Chi	A monotonicity result for the range of a perturbed random walk	Journal of Theoretical Probability			2014
Chen, Lung-Chi	Asymptotic Behavior for a Version of Directed Percolation on the Triangular Lattice	J. Stat. Phys.	Y		2014
Chen, Lung-Chi	Asymptotic Behavior for a Version of Directed Percolation on the honeycomb Lattice	Physica A	Y		2015
Chen, Lung-Chi	Critical two-point functions for long-range statistical-mechanical models in high dimensions	Ann. Probab.			2015
Chen, Lung-Chi	Asymptotic behavior for a generalized Domany Kinzel model	J. Stat. Mech	Y	Y	2017
Chen, Ray-Bing	Screening Procedure for Supersaturated Designs Using a Bayesian Variable Selection Method	Quality and Reliability Engineering International	Y		2013
Chen, Ray-Bing	Optimizing Latin Hypercube Designs by Particle Swarm	Statistics and Computing	Y		2013
Chen, Ray-Bing	Contour Estimation via Two Fidelity Computer Simulators under Limited Resources	Computational Statistics	Y		2013
Chen, Ray-Bing	Discrete Particle Swarm Optimization for Constructing Uniform Design on Irregular Regions	Computational Statistics and Data Analysis	Y		2014
Chen, Ray-Bing	TVICA - Time Varying Independent Component Analysis and Its Application to Financial Data	Computational Statistics and Data Analysis	Y		2014
Chen, Ray-Bing	Adaptive Block Size for Dense QR Factorization in Hybrid CPU-GPU Systems via Statistical Modeling	Parallel Computing	Y		2014
Chen, Ray-Bing	Using Animal Instincts to Design Efficient Biomedical Studies via Particle Swarm Optimization	Swarm and Evolutionary Computation	Y		2014

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Chen, Ray-Bing	A Note on Conditionally Optimal Star Points in Central Composite Designs for Response Surface Methodology	Journal of the Chinese Statistical Association			2015
Chen, Ray-Bing	COPICA - Independent Component Analysis via Copula Techniques	Statistics and Computing	Y		2015
Chen, Ray-Bing	A Modified Particle Swarm Optimization Technique for Finding Optimal Designs for Mixture Models	PLoS ONE	Y		2015
Chen, Ray-Bing	Minimax Optimal Designs via Particle Swarm Optimization Methods	Statistics and Computing	Y		2015
Chen, Ray-Bing	BSGS: Bayesian Sparse Group Selection	The R Journal	Y		2015
Chen, Ray-Bing	Exact D-Optimal Designs for Michaelis-Menten Model with Correlated Observations by Particle Swarm Optimization	Festschrift in Honor of Hans Nyquist on the Occasion of His 65th Birthday	Y		2015
Chen, Ray-Bing	Bayesian Variable Selection for Finite Mixture Model of Linear Regressions	Computational Statistics and Data Analysis	Y		2016
Chen, Ray-Bing	Optimizing Two-level Supersaturated Designs using Swarm Intelligence Techniques	Technometrics	Y		2016
Chen, Ray-Bing	Bayesian Variable Selection for Probit Model with Componentwise Gibbs Sampler	Communications in Statistics - Simulation and Computation	Y		2016
Chen, Ray-Bing	Bayesian Sparse Group Selection	Journal of Computational and Graphical Statistics	Y		2016
Chen, Ray-Bing	Sequential Designs Based on Bayesian Uncertainty Quantification in Sparse Representation Surrogate Modeling	Technometrics	Y		2016
Chen, Ray-Bing	Surrogate-Assisted Tuning for Computer Experiments with Qualitative and Quantitative Parameters	Statistica Sinica			2017
Cheng , Ching-hsiao	Well-posedness of the Muskat problem with H2 initial data	Advances in Mathematics	Y		preprint
Cheong, Wan Keng	A note on a generalization of the multiple cover formula and the simple flop	Communications in Algebra			2012
Cheong, Wan Keng	Orbifold GromovVWitten theory of the symmetric product of A_r	Geometry & Topology			2012
Cheong, Wan Keng	Strengthening the cohomological crepant resolution conjecture for HilbertVChow morphisms	Mathematische Annalen			2013
Cheong, Wan Keng	From GW invariants of symmetric product stacks to relative invariants of threefolds. In: Algebraic Geometry in East Asia (Taipei)	Advanced Studies in Pure Mathematics	Y		2015
Cheong, Wan Keng	On GromovVWitten invariants of some wreath product stacks		Y		preprint
Chern, I-Liang	Simulating binary fluid-surfactant dynamics by a phase field model	Discrete and Continuous Dynamical Systems - Series B	Y		2012
Chern, I-Liang	A Perfect Match Condition for Point-Set Matching Problems Using the Optimal Mass Transport Approach	SIAM J. on Imaging Sciences			2013
Chern, I-Liang	Numerical method of fabric dynamics using front tracking and spring model	Comm. in Comput. Physics		Y	2013
Chern, I-Liang	Efficient methods for computing ground states of spin-1 Bose-Einstein condensates based on their characterizations	Journal of Computational Physics			2013
Chern, I-Liang	Long-time behavior of the nonlinear Schr ?odingerVLangevin equations	Bulletin of the Institute of Mathematics, Academia Sinica	Y		2013

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Chern, I-Liang	Mitigate B11 Inhomogeneity Using Spatially Selective Radio-frequency Excitation with Generalized Spatial Encoding Magnetic Fields	Magnetic Resonance in Medicine			2014
Chern, I-Liang	Spectral collocation and a two-level continuation scheme for dipolar Bose-Einstein condensates	Journal of Computational Physics			2014
Chern, I-Liang	String-averaging expectation maximization for maximum likelihood estimation in emission tomography	Inverse Problems	Y		2014
Chern, I-Liang	A kinetic energy reduction technique and characterizations of the ground states of spin-1 Bose-Einstein condensates	Discrete and Continuous Dynamical Systems, Ser. B			2014
Chern, I-Liang	Accurate Gradient Approximation for Complex Interface Problems in 3D by an Improved Coupling Interface Method	Journal of Computational Physics		Y	2014
Chern, I-Liang	A Complete Study of the Ground State Phase Diagrams of Spin-1 Bose-Einstein Condensates in a Magnetic Field via Continuation Methods	Journal of Scientific Computing	Y		2015
Chern, I-Liang	Stability of non-monotone critical traveling waves for reaction-diffusion equation with time-delay	Journal of Differential Equations			2015
Chern, Jann-Long	Evaluating solutions on an elliptic problem in a gravitational gauge field theory	J. Funct. Anal		Y	2013
Chern, Jann-Long	The non-topological fluxes of a two-particle system in the Chern-Simons theory	J. Differential Equations		Y	2014
Chern, Jann-Long	Topological multivortex solutions for the Chern-Simons system with two Higgs particles	Comm. Partial Differential Equations		Y	2016
Chern, Jann-Long	Uniqueness of topological multivortex solutions in the Maxwell-Chern-Simons model	J. Funct. Anal.		Y	2016
Chiang, River	Open books for Boothby–Wang bundles, fibered Dehn twists and the mean Euler characteristic	Internat. J. Math.			2014
Chiang, River	Non-fillable invariant contact structures on principal circle bundles and left-handed twists	J. Symplectic Geom.			2016
Chiang, River	Homologically trivial symplectic cyclic actions need not extend to circle actions		Y		preprint
Chiang, River	Cyclic actions on ruled symplectic 4-manifolds		Y		preprint
Chiu, Hung-Lin	Embeddability for 3-Dimensional Cauchy-Riemann Manifolds and CR Yamabe Invariants	Duke Math. J.			2012
Chiu, Hung-Lin	Embedded Three-Dimensional CR Manifolds and The Non-Negativity of Paneitz Operators.	Contemp. Math.			2013
Chiu, Hung-Lin	Uniformization of Spherical CR Manifolds	Adv. Math.			2014
Chiu, Hung-Lin	The Fundamental Theorem for Hypersurfaces in Heisenberg Groups	Calc. Var. Partial Differential Equations 54	Y	Y	2015
Chiu, Hung-Lin	Umbilic Hypersurfaces of Constant Sigma-K Curvature in The Heisenberg Group	Calc. Var. Partial Differential Equations 55	Y	Y	2016
Chuah, Meng-Kiat	Finite order automorphisms on real simple Lie algebras	Transactions of the American Mathematical Society			2012
Chuah, Meng-Kiat	Finite order automorphisms on contragredient Lie superalgebras	Journal of Algebra			2012
Chuah, Meng-Kiat	Contragredient supersymmetric pairs	Journal of Mathematical Physics			2013
Chuah, Meng-Kiat	Double Vogan diagrams and irreducible pseudo-Hermitian symmetric spaces	Mathematical Research Letters			2013
Chuah, Meng-Kiat	Cartan automorphisms and Vogan superdiagrams	Mathematische Zeitschrift			2013

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Chuah, Meng-Kiat	Partially harmonic forms and models of H-series	Journal of Functional Analysis			2014
Chuah, Meng-Kiat	Hermitian real forms of contragredient Lie superalgebras	Journal of Algebra?	Y		2015
Chuah, Meng-Kiat	Dirac cohomology and geometric quantization	Journal fur die Reine und Angewandte Mathematik	Y		2016
Chuah, Meng-Kiat	Outer automorphism groups of simple Lie algebras and symmetries of painted diagrams	Forum Mathematicum	Y		2017
Chuah, Meng-Kiat	Admissible positive systems of affine non-twisted Kac-Moody Lie algebras	Journal of Algebra 453	Y		2017
Chuang, Wu-yen	Chamber Structure and Wallcrossing in the ADHM Theory of Curves II	Journal of Geometry and Physics			2012
Chuang, Wu-yen	Geometric Engineering of Framed BPS States	Advances in Theoretical and Mathematical Physics			2014
Chuang, Wu-yen	Parabolic Refined Invariants and MacDonald Polynomials	Communications in Mathematical Physics			2015
Chuang, Wu-yen	Stability and Fourier-Mukai Transforms on Higher Dimensional Elliptic Fibrations	Communications in Analysis and Geometry	Y	Y	2016
Guo, Meihui	Test for dispersion constancy in stochastic differential equation models	Applied Stochastic Models in Business and Industry	Y		2012
Guo, Meihui	Dynamic Comovement Detection of High Frequency Financial Data	Journal of Data Science			2012
Guo, Meihui	Estimation of MA(1) Model based on Rounded Data	Tatra Mountains Mathematical Publication			2012
Guo, Meihui	Optimal Multi-Period Quadratic RiskAdjusted Hedging Strategy	Journal of the Korean Statistical Society			2013
Guo, Meihui	Goodness-of-fit Test for Stochastic Volatility Models	Journal of Multivariate Analysis	Y		2013
Guo, Meihui	A Deterministic Equivalent for the Analysis of Non-Gaussian Correlated MIMO Multiple Access Channels	IEEE Transactions on Information Theor			2013
Guo, Meihui	The Bickel-Rosenblatt Test for Continuous Time Stochastic Volatility Models	TEST	Y		2014
Guo, Meihui	Model Risk of the Implied GARCH-normal Model	Quantitative Finance			2015
Guo, Meihui	Monitoring Change Point for Diffusion Parameter Based on Discretely Observed Sample from SDE Models	Applied Stochastic Models in Business and Industry	Y		2015
Guo, Meihui	COPICA - Independent Component Analysis Via Copula Techniques	Statistics and Computing	Y		2015
Guo, Meihui	Assessing Influential Trade Effects via High Frequency Market Reactions	Journal of Applied Statistics			2015
Guo, Meihui	Goodness-of-fit Test for Stochastic Volatility Models Based on Noisy Observations	Statistica Sinica			2016
Guo, Meihui	Estimation of Inverse Autocovariance Matrices for Long Memory Processes	Bernoulli Journal			2016
Guo, Meihui	Optimal Restricted Quadratic Estimator of Integrated Volatility	Optimal Restricted Quadratic Estimator of Integrated Volatility			2016
Ho, Nan-Kuo	Intersection Cohomology of the Universal Imploded Cross-section of SU(3)	Pure and Applied Mathematics Quarterly			2014
Ho, Nan-Kuo	Connected Components of Surface Group Representations for Complex reductive Lie groups, an appendix in Covering Spaces of Character Varieties by S. Lawton and D. Ramras	New York Journal of Mathematics		Y	2015

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Ho, Nan-Kuo	Hitchin's Equations on a Nonorientable Manifold	Comm. Anal. Geom		Y	2016
Ho, Nan-Kuo	Deformation of the moduli space of Higgs bundles over a nonorientable manifold				preprint
Ho, Nan-Kuo	Hitchin's Equations on a Nonorientable Manifold			Y	preprint
Ho, Nan-Kuo	Conditions of smoothness of moduli spaces of at connections and of representation varieties			Y	preprint
Ho, Nan-Kuo	Lie-theoretic description of the solution space of the tt*-Toda equations			Y	preprint
Ho, Nan-Kuo	The representation variety of a compact oriented surface			Y	preprint
Horng, Tzyy-Leng	PNP equations with steric effects: a model of ion flow through channels	Journal of Physical Chemistry B			2012
Horng, Tzyy-Leng	Investigation of the spatiotemporal responses of nanoparticles in tumor tissues with a small-scale mathematical model	PLoS One			2013
Horng, Tzyy-Leng	Mechanical Properties Measurement of Polymer Films by Bulge Test and Fringe Projection	Advances in Materials Science and Engineering			2014
Horng, Tzyy-Leng	Facile simulation of carbon with wide pore size distribution for electric double-layer capacitance based on Helmholtz model	Journal of Materials Chemistry A			2015
Horng, Tzyy-Leng	Direct-Forcing Immersed Boundary Method for Mixed Heat Transfer	Communications in Computational Physics			2015
Horng, Tzyy-Leng	Hydroelastic study of single degree of freedom circular cylinder submerged in progressive wave train	Fluid Dynamics Research			2016
Hsia, Chun-Hsiung	Dynamical bifurcation of the two dimensional Swift-Hohenberg equation with odd periodic condition	Discrete Contin. Dyn. Syst. Ser. B			2012
Hsia, Chun-Hsiung	On the asymptotic stability analysis and the existence of time-periodic solutions of the primitive equations	Indiana Univ. Math. J.			2013
Hsia, Chun-Hsiung	Well-posedness for the BBM- equation in a quarter plane	Discrete Contin. Dyn. Syst. Ser.			2014
Hsia, Chun-Hsiung	Tropical atmospheric circulations with humidity effects	Proc. A.			2015
Hsia, Chun-Hsiung	Time-periodic solutions of the primitive equations of large-scale moist atmosphere: existence and stability	Appl. Anal.			2015
Hsia, Chun-Hsiung	Singularity of macroscopic variables near boundary for gases with cutoff hard potential	SIAM J. Math. Anal.			2015
Hsia, Chun-Hsiung	Global well-posedness and singularity propagation for the BBM-BBM system on a quarter plane	Adv. Differential Equations			2016
Hsia, Chun-Hsiung	On time periodic solutions, asymptotic stability and bifurcations of Navier-Stokes equations	Numer. Math.		Y	2016
Hsia, Chun-Hsiung	Asymptotic stability and bifurcation of time-periodic solutions for the viscous Burgersequation	Journal of Mathematical Analysis and Applications		Y	2016
Hsia, Chun-Hsiung	Thien Binh; Shiue, Ming-Cheng On time periodic solutions, asymptotic stability and bifurcations of Navier-Stokes equations	Numer. Math.		Y	2017

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Hsiao, Chin-Yu	On the coefficients of the asymptotic expansion of the kernel of Berezin-Toeplitz quantization	Annals of Global Analysis and Geometry: Volume 42, Issue 2			2012
Hsiao, Chin-Yu	Szego kernel asymptotics and Morse inequalities on CR manifolds	Math. Z.			2012
Hsiao, Chin-Yu	The tangential Cauchy-Riemann complex on the Heisenberg group Via Conformal Invariance	Bulletin of the Institute of Mathematics Academia Sinica, volume			2013
Hsiao, Chin-Yu	Asymptotics of spectral function of lower energy forms and Bergman kernel of semi-positive and big line bundles	Communications in Analysis and Geometry			2014
Hsiao, Chin-Yu	Bergman kernel asymptotics and a pure analytic proof of Kodaira embedding theorem, Complex Analysis and Geometry	Springer Proceedings in Mathematics and Statistics			2015
Hsiao, Chin-Yu	On CR Paneitz operators and CR pluriharmonic functions	Math. Ann.			2015
Hsiao, Chin-Yu	Solving Kohn Laplacian on asymptotically flat pseudohermitian 3-manifolds	Adv. Math.			2015
Hsiao, Chin-Yu	Existence of CR sections for high power of semi-positive generalized Sasakian CR line bundles over generalized Sasakian CR manifolds	Ann. Glob. Anal. Geom			2015
Hsiao, Chin-Yu	The second coefficient of the asymptotic expansion of the weighted Bergman kernel on Cn	Bulletin of the Institute of Mathematics Academia Sinica		Y	2016
Hsiao, Chin-Yu	Morse inequalities for Fourier components of KohnVRossi cohomology of CR manifolds with S1-action	Math. Z.		Y	2016
Hsiao, Chin-Yu	Extremal metrics for the Q0-curvature in three dimensions	C. R. Math. Acad. Sci. Paris			2016
Hsiao, Chin-Yu	G-invariant Szego kernel asymptotics and CR reduction, 60 pages	Available at arXiv		Y	preprint
Hsiao, Chin-Yu	Heat kernel asymptotics, local index theorem and trace integrals for CR manifolds with S1 action	Available at arXiv		Y	preprint
Hsiao, Chin-Yu	Szego kernel asymptotic expansion on CR manifolds with S1 action	Available at arXiv		Y	preprint
Hsiao, Chin-Yu	Equivariant Kodaira embedding of CR manifolds with circle action	Available at arXiv		Y	preprint
Hsiao, Chin-Yu	The asymptotics of the analytic torsion on CR manifolds with S1 action	Available at arXiv		Y	preprint
Hsiao, Chin-Yu	Szego kernel asymptotics and Morse inequalities on CR manifolds with S1 action	Available at arXiv			preprint
Hsiao, Chin-Yu	Extremal metrics for the Q0-curvature in three dimensions	Available at arXiv			preprint
Hsiao, Chin-Yu	On the stability of equivariant embedding of compact CR manifolds with circle action	Math. Z.		Y	to appear
Hsiao, Chin-Yu	Szego kernel expansion and equivariant embedding of CR manifolds with circle action	Annals of Global Analysis and Geometry		Y	to appear
Hsiao, Chin-Yu	Berezin-Toeplitz quantization for lower energy forms	Communications in Partial Differential Equations		Y	to appear
Hsiao, Chin-Yu	Szeg? kernel asymptotics and Kodaira embedding theorems of Levi-flat CR manifolds	Mathematical Research Letters		Y	to appear
Hsiao, Chin-Yu	On the singularities of the Szego projections on lower energy forms	Journal of Differential Geometry		Y	to appear
Hsiao, Chin-Yu	Szego kernel asymptotics for high power of CR line bundles and Kodaira embedding theorems on CR manifolds	Memoirs of the American Mathematical Society		Y	to appear

Author	Title	Journal	Ack	AFF	Year
Hsieh, Chih-hao	Detecting causality in complex ecosystems	Science			2012
Hsieh, Chih-hao	Metagenomic analysis reveals a functional signature for biomass degradation by cecal microbiota in the leaf-eating flying squirrel (Petaurista alborufus lena)	BMC Genomics			2012
Hsieh, Chih-hao	Long-term change in the diet of Gymnogobius isaza from Lake Biwa, Japan: effects of body size and prey availability	PLoS ONE			2012
Hsieh, Chih-hao	Nonlinear dynamic features and co-predictability of the Georges Bank fish community	Marine Ecology Progress Series			2012
Hsieh, Chih-hao	Using coupled fish behavior-hydrodynamic model to investigate spawning migration of Japanese anchovy, Engraulis japonicus, from the East China Sea to Taiwan	Fisheries Oceanography			2012
Hsieh, Chih-hao	Evaluation of multi-scale climate effects on the recruitment of Japanese eel, Anguilla japonica, to Taiwan	PLoS One			2012
Hsieh, Chih-hao	Methods of training set construction toward improving classification performance for automated mesozooplankton image classification system	Continental Shelf Research			2012
Hsieh, Chih-hao	Exploring spatialtemporal ecological variations by the multiscale interpolation	Ecological Modelling			2012
Hsieh, Chih-hao	Increasing zooplankton size diversity enhances the strength of top-down control on phytoplankton through diet niche partitioning	Journal of Animal Ecology			2013
Hsieh, Chih-hao	Scaling of growth rate and mortality with size and its consequence on size spectra of natural microphytoplankton assemblages in the East China Sea	Biogeosciences			2013
Hsieh, Chih-hao	Copepod community growth rates in relation to body size, temperature, and food availability in the East China Sea - a test of metabolic theory	Biogeosciences			2013
Hsieh, Chih-hao	Predicting climate effects on Pacific sardine	Proceedings of the National Academy of Sciences			2013
Hsieh, Chih-hao	Effects of increasing nutrient supply and omnivorous feeding on the slope of size spectrum: a size-based nutrient-phytoplankton-zooplankton model	Population Ecology			2013
Hsieh, Chih-hao	Difference in adaptive dispersal abilities can promote species coexistence in fluctuating environments	PLoS ONE			2013
Hsieh, Chih-hao	A kernel-based method for estimating copepod growth rates when biomass distribution is multi-modal	Zoological Studies			2013
Hsieh, Chih-hao	Dynamics of phytoplankton community under photoinhibition	Bulletin of Mathematical Biology			2013
Hsieh, Chih-hao	Discrimination between the influences of river discharge and coastal upwelling on summer microphytoplankton phosphorus stress in the East China Sea	Continental Shelf Research			2013
Hsieh, Chih-hao	Spatial heterogeneity of gut microbiota reveals multiple bacterial communities with distinct characteristics	Scientific Reports			2014
Hsieh, Chih-hao	Phytoplankton functional group dynamics explain species abundance distribution in a directionally changing environment	Ecology			2014
Hsieh, Chih-hao	Stable isotope ratios reveal food source of benthic fish and crustaceans along a gradient of trophic status in the East China Sea	Continental Shelf Research			2014
Hsieh, Chih-hao	Linking secondary structure of individual size distribution with nonlinear size-trophic level relationship in food webs	Ecology			2014
Hsieh, Chih-hao	Mesozooplankton size structure in response to environmental conditions in the East China Sea: How much does size spectra theory fit empirical data of a dynamic coastal area?	Progress in Oceanography			2014
Hsieh, Chih-hao	Seasonal succession of zooplankton community linking to the environmental and phytoplankton dynamics in Feitsui Reservoir, northern Taiwan	Limnologica			2014

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Hsieh, Chih-hao	Dynamic complexity may limit prediction in marine fisheries	Fish and Fisheries			2014
Hsieh, Chih-hao	Modeling dynamic interactions and coherence between marine zooplankton and fishes linked to environmental variability	Journal of Marine Systems			2014
Hsieh, Chih-hao	Individual species-area relationship of woody plant communities in a subtropical monsoon rainforest	PLoS ONE			2015
Hsieh, Chih-hao	Equation-free mechanistic ecosystem forecasting using empirical dynamic modeling	Proceedings of the National Academy of Sciences			2015
Hsieh, Chih-hao	Climate effects on temporal variation in abundance and distribution of the demersal fish assemblage in the Tsushima Warm Current region of the Japan Sea	Fisheries Oceanography			2015
Hsieh, Chih-hao	Determinism of bacteria metacommunity dynamics in the southern East China Sea varies depending on hydrography	Ecography			2015
Hsieh, Chih-hao	Trophic structure of the pelagic food web in the East China Sea	Zoological Studies			2015
Hsieh, Chih-hao	Evaluating community-environment relationships along fine to broad taxonomic resolutions reveals evolutionary forces underlying community assembly		Y	Y	2016
Hsieh, Chih-hao	Life history traits and exploitation affect the spatial mean-variance relationship in fish abundance	Ecology	Y		2016
Hsieh, Chih-hao	Predator-prey mass ratio revisited: Does preference of relative prey body size depend on predator body size?	Functional Ecology	Y		2016
Hsieh, Chih-hao	Summer profundal hypoxia rather than winter mixing determines the coupling of methanotrophic production and pelagic foodweb	Freshwater Biology	Y		2016
Hsieh, Chih-hao	Comparison of copepod species-based and individual-size-based community structuring	Journal of Plankton Research	Y		2016
Hsieh, Chih-hao	Evaluating community-environment relationships along fine to broad taxonomic resolutions reveals evolutionary forces underlying community assembly	ISME Journal	Y		2016
Hsieh, Chih-hao	Predator-prey mass ratio revisited: Does preference of relative prey body size depend on predator body size?	Functional Ecology	Y		2016
Hsieh, Chih-hao	Nutrient pulses driven by internal solitary waves enhance heterotrophic bacterial growth in the South China Sea	Environmental Microbiology			2016
Hsieh, Chih-hao	Predator size diversity promotes biomass trophic transfer and prey size diversity hinders it in planktonic communities	Proceedings of the Royal Society of London	Y		2016
Hsieh, Chih-hao	Life history traits and exploitation affect the spatial mean-variance relationship in fish abundance	Ecology	Y		2016
Hsieh, Chih-hao	Modified FlowCAM procedure for quantifying size distribution of zooplankton with sample recycling capacity	PloS ONE	Y	Y	2017
Hsieh, Chih-hao	Elevated nonlinearity as an indicator of shifts in the dynamics of populations under stress	Journal of the Royal Society Interface	Y		2017
Hsieh, Chih-hao	Abundant and rare picoeukaryotic sub-communities present contrasting patterns in marginal seas of the northwestern Pacific Ocean	Environmental Microbiology	Y	Y	2017
Hsieh, Chih-hao	The influence of episodic flooding on pelagic ecosystem in the East China Sea	Biogeosciences			preprint
Hsieh, Chih-hao	Empirical Dynamic Modeling for beginners	Ecological Research	Y	Y	preprint
Hsieh, Ming-Lun	On the non-vanishing of Hecke L-values modulo p.?	American Journal of Mathematics			2012
Hsieh, Ming-Lun	The vanishing of mu-invariant of p-adic L-functions for CM fields	International Mathematics Research Notices			2013
Hsieh, Ming-Lun	Special values of anticyclcotomic Rankin-Selberg L-functions	Documenta Mathematica			2014

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Hsieh, Ming-Lun	On the vanishing of mu-invariant of anticyclotomic p-adic L-functions for CM fields	Journal fur die reine und angewandte Mathematik			2014
Hsieh, Ming-Lun	Eisenstein congruence and Iwasawa main conjectures for CM fields	Journal of the American Mathematical Society			2014
Hsieh, Ming-Lun	On the anticyclotomic Iwasawa main conjecture for modular forms	Compositio Mathematica			2015
Hsieh, Ming-Lun	Special values of anticyclotomic L-functions for modular forms	Journal fur die Reine und Angewandte Mathematik			2016
Hsieh, Ming-Lun	Bessel periods and the non-vanishing of Yoshida lifts modulo a prime	Mathematische Zeitschrift	Y	Y	2016
Hsieh, Ming-Lun	Heegner cycles and p-adic L-functions	Mathematische Annalen	Y	Y	2017
Hsu, Sze-Bi	A Lotka-Volterra competition model with season succession	J. Math. Biology			2012
Hsu, Sze-Bi	Global dynamics of zooplankton and harmful algae in flowing habitats	JDE			2013
Hsu, Sze-Bi	Dynamics of phytoplankton communities under photo-inhibition	Bull Math. Biol.			2013
Hsu, Sze-Bi	A nonlocal problem from conservation biology	SIAM Journal of Mathematical Analysis			2014
Hsu, Sze-Bi	Multiple steady-state in phytoplankton population induced by photo-inhibition	JDE			2015
Hsu, Sze-Bi	A pivotal eigenvalue problem in river ecology	JDE			2015
Hsu, Sze-Bi	Competition between microorganisms for a single limiting resource with cell quota structure and spatial variation	J. Math. Biol			2012
Hsu, Sze-Bi	On a nonlocal reaction-diffusion-advection system modeling the growth of phytoplankton with cell quota structure	JDE			2015
Hsu, Sze-Bi	A reaction-diffusion-advection model of harmful algae growth with toxin degradation	JDE			2015
Hsu, Sze-Bi	Classification of potential flow under renormalization group transforms	Discrete and Continuous Dynamical Systems - Series B		Y	2016
Hsu, Sze-Bi	Competition for two essential resources with internal storage and periodic input in a chemostat	Differential and Integral Equations			2016
Hsu, Sze-Bi	Growth of single phytoplankton species with internal storage in a water column	Discrete and Continuous Dynamical Systems - Series B			2016
Hsu, Sze-Bi	Dynamics of harmful algae with seasonal temperature variation in the cove Vmain lake	Discrete and Continuous Dynamical Systems - Series B			2016
Hsu, Sze-Bi	Algal competition in a water column with excessive dioxide in the atmosphere.	J. Mathematical Biology		Y	2016
Hsu, Sze-Bi	Theory of a microfluidic serial dilution bioreactor for the growth of planktonic and biofilm population	J. Math. Biology			2016
Hsu, Sze-Bi	The Morbidostat: A Bio-reactor that promotes selection for drug resistance in bacteria	SIAM J. Applied Mathematics			2017
Huang, Hsin-Yuan	The Domain Geometry and the Bubbling Phenomenon of Rank Two Gauge Theory	Commun. Math. Phys.		Y	2016
Jow, Shin-Yao	The effective cone of the space of parametrized rational curves in a Grassmannian	Math. Z.			2012
Jow, Shin-Yao	Asymptotic order-of-vanishing functions on the pseudoeffective cone	Pacific Journal of Mathematics	Y		2016
Jow, Shin-Yao	Fano varieties with finitely generated semigroups in the Okounkov body construction	Mathematical Research Letters	Y		2016

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Lai, Ming-Chih	New Numerical Results for the Surface Quasi-Geostrophic Equation	Journal of Scientific Computing			2012
Lai, Ming-Chih	The immersed boundary method for two-dimensional foam with topological changes	Communications in Computational Physics	Y		2012
Lai, Ming-Chih	Simulating binary fluid-surfactant dynamics by a phase field model	Discrete and Continuous Dynamical Systems - Series B	Y		2012
Lai, Ming-Chih	A fractional step immersed boundary method for Stokes flow with an inextensible interface enclosing a solid particle	SIAM Journal of Scientific Computing		Y	2012
Lai, Ming-Chih	Numerical study for viscosity and inertial effects on vesicle tank-treading to tumbling motion under shear flow	Physical Review E?86	Y		2012
Lai, Ming-Chih	Unconditionally energy stable immersed boundary method with application to vesicle dynamics	East Asian Journal on Applied Mathematics	Y		2013
Lai, Ming-Chih	A conservative scheme for solving coupled surface-bulk convection-diffusion equations with an application to interfacial flows with soluble surfactant	Journal of Computational Physics	Y		2014
Lai, Ming-Chih	A coupled immersed interface and level set method for three-dimensional interfacial flows with insoluble surfactant	Communications in Computational Physics	Y		2014
Lai, Ming-Chih	An immersed boundary method for simulating the dynamics of three-dimensional axisymmetric vesicles in Navier-Stokes flows	Journal of Computational Physics	Y		2014
Lai, Ming-Chih	Numerical simulations of three-dimensional foam by the immersed boundary method	Journal of Computational Physics			2014
Lai, Ming-Chih	An unconditionally energy stable penalty immersed boundary method for simulating the dynamics of an inextensible interface interacting with a solid particle	Journal of Scientific Computing			2015
Lai, Ming-Chih	A hybrid immersed boundary and immersed interface method for electrohydrodynamic simulations	Journal of Computational Physics			2015
Lai, Ming-Chih	An immersed interface method for axisymmetric electrohydrodynamic simulations in Stokes flow	Communications in Computational Physics	Y		2015
Lai, Ming-Chih	Amoeboid motion in confined geometry	Rapid Communications			2015
Lai, Ming-Chih	Vesicle electrohydrodynamic simulations by coupling immersed boundary and immersed interface method	?Journal of Computational Physics	Y	Y	2016
Lai, Ming-Chih	Electrohydrodynamics of a viscous drop with inertia	Physical Review E?93	Y		2016
Lai, Ming-Chih	Controlling droplet bouncing and coalescence with surfactant	Journal of Fluid Mechanics			2016
Lai, Ming-Chih	An immersed boundary method for simulating vesicle dynamics in three dimensions?	Journal of Computational Physics	Y	Y	2016
Lai, Ming-Chih	Amoeboid swimming in a channel	Soft Matter			2016
Lai, Ming-Chih	A short note on Navier-Stokes flows with an incompressible interface and its approximations	Applied Mathematics Letters	Y	Y	2017
Lai, Ming-Chih	Numerical simulations of vesicle and bubble dynamics in two-dimensional four-roll mill flows	Physical Review E	Y		2017
Lam, Ching Hung	Classification of holomorphic framed vertex operator algebras of central charge 24	Amer. J. Math.		Y	2015
Lam, Ching Hung	Griess algebras generated by the Griess algebras of two $3A$-algebras with a common axis	J. Math. Soc. of Japan		Y	2015
Lam, Ching Hung	Groups of Lie type, vertex algebras, and modular moonshine	International Mathematical Research Notices	Y		2015
Lam, Ching Hung	Orbifold construction of holomorphic vertex operator algebras associated to inner automorphisms	Communications in Mathematical Physics		Y	2016
Lam, Ching Hung	Quantum dimensions and fusion rules of the VOA $V_L_C\times D\^\tau$	Journal of Algebra		Y	2016

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Lam, Ching Hung	A holomorphic framed vertex operator algebras of central charge 24 whose weight one Lie algebra has type $A_6,7$	Letters in Mathematical Physics			2016
Lam, Ching Hung	On $\mathbbZ_3$-orbifold construction of the Moonshine vertex operator algebra				preprint
Lam, Ching Hung	Reverse orbifold construction and uniqueness of holomorphic vertex operator algebras				preprint
Lam, Ching Hung	3-dimensional Griess algebras and Miyamoto involutions			Y	preprint
Lam, Ching Hung	The Conway-Miyamoto correspondences for the Fischer 3-transposition groups			Y	preprint
Lee, Ming-Yi	On Weak-Star Convergence in Product Hardy Spaces on Spaces of Homogeneous type		Y	Y	2016
Lin, Chin-Cheng	Boundedness of singular integrals with flag kernels on weighted flag Hardy spaces			Y	preprint
Lin, Chin-Cheng	Characterization of Besov spaces associated with parabolic sections			Y	preprint
Lin, Chin-Cheng	Hilbert transform characterization and Fefferman-Stein decomposition for Triebel-Lizorkin spaces	Michigan Mathematical Journal			2013
Lin, Chin-Cheng	Hardy spaces associated with different homogeneities and boundedness of composition operators	Revista Matematica Iberoamericana			2013
Lin, Chin-Cheng	Semigroup characterization of Besov type Morrey space and well-posedness of generalized Navier-Stokes equations	Differential Equations			2013
Lin, Chin-Cheng	A p,E weights, maximal operators, and Hardy spaces associated with a family of general sets	J. Fourier Anal. Appl			2014
Lin, Chin-Cheng	Criterion of the L2 boundedness and sharp endpoint estimates for singular integral operators on product spaces of homogeneous type	Ann. Sc. Norm. Super. Pisa Cl. Sci.			2016
Lin, Chin-Cheng	Tb theorem on product spaces	Mathematical Proceedings of Cambridge Philosophical Soc.	Y		2016
Lin, Chin-Cheng	Boundedness of Monge-Ampere singular integral operators acting on Hardy spaces and their duals	Transactions of Amer. Math. Soc.			2016
Lin, Chin-Cheng	Characterization of Campanato spaces associated with parabolic sections	Asian Journal of Mathematics			2016
Lin, Chin-Cheng	Carleson measure characterization of weighted BMO associated with a family of general sets	Journal of Geometric Analysis	Y		2017
Lin, Chun-Chi	L$\hat{2}$-flow of elastic curves with clamped boundary conditions	J. Differential Equations	Y		2012
Lin, Chun-Chi	Evolution of open elastic curves in R$\hat{n}$ subject to fixed length and natural boundary conditions	Analysis (Berlin)	Y		2014
Lin, Chun-Chi	Interior continuity of two-dimensional weakly stationary-harmonic multiple-valued functions	J. Geom. Anal.	Y		2014
Lin, Chun-Chi	The second-order L$\hat{2}$-flow of inextensible elastic curves with hinged ends in the plane	J. Elasticity	Y	Y	2015
Lin, Chun-Chi	A gradient flow for open elastic curves with fixed length and clamped ends	Ann SNS Pisa	Y	Y	2016
Lin, Min-Hsiung	The Eigenvalue Shift Technique and Its Eigenstructure Analysis of a Matrix	Journal of Computational and Applied Mathematics	Y		2013
Lin, Min-Hsiung	Perturbation Analysis of the Stochastic Algebraic Riccati Equation	Journal of Inequalities and Applications	Y		2013
Lin, Min-Hsiung	Tensor Spline Approximation in Economic Dynamics with Uncertainties	Computational Economics			2013
Lin, Min-Hsiung	The shift techniques for a nonsymmetric algebraic Riccati equation	Applied Mathematics and Computation	Y		2013

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Lin, Min-Hsiung	A Study of Singular Spectrum Analysis with Global Optimization Techniques	Journal of Global Optimization			2014
Lin, Min-Hsiung	On the Finite Rank and Finite- Dimensional Representation of Bounded Semi-Infinite Hankel Operators	IMA Journal of Numerical Analysis			2014
Lin, Min-Hsiung	Numerical Methods for Solving Nonnegative Inverse Singular Value problems with Prescribed Structure	Inverse Problems	Y		2014
Lin, Min-Hsiung	Nonnegative Rank Factorization – A Heuristic Approach via Rank Reduction	NUMERICAL ALGORITHMS			2014
Lin, Min-Hsiung	An Algorithm for Constructing Nonnegative Matrices with Prescribed Real Eigenvalues	Applied Mathematics and Computation	Y		2015
Lin, Min-Hsiung	A note on Sylvester-type equations	Journal of the Franklin Institute	Y		2015
Lin, Min-Hsiung	Preconditioned Iterative Methods for Space-Time Fractional Advection-Diffusion Equations	Journal of Computational Physics			2016
Lin, Tai-Chia	Existence and Multiplicity of Positive Solutions for Two Coupled Nonlinear Schrodinger Equations	DCDS-A	Y	Y	2013
Lin, Tai-Chia	On Phase-Separation Model: Asymptotics and Qualitative Properties, Archive for Rational Mechanics and Analysis		Y		2013
Lin, Tai-Chia	Ground States of Nonlinear SchrLodinger Systems with Saturable Nonlinearity in R2 for Two Counterpropagating Beams	Journal of Mathematical Physics	Y	Y	2014
Lin, Tai-Chia	Development of Traveling Waves to An Interacting Two-Species Chemotaxis Model, Discrete and Continuous Dynamical Systems A		Y		2014
Lin, Tai-Chia	Exponential Decay Estimates for The Stability of Boundary Layer Solutions to Poisson-Nernst-Planck Systems: One Spatial Dimension Case	SIAM J. Math. Anal.		Y	2015
Lin, Tai-Chia	Asymptotic Analysis of Poisson-Boltzmann Equations with Constrained Ionic Densities for Multi-Species Ions	Comm. Math. Sci.	Y	Y	2016
Lin, Wen-Wei	An Efficient Algorithm of Yau-Yau Method for Solving Nonlinear Filtering Problems	Commun. Inf. System			2014
Lin, Wen-Wei	A Novel Efficient Homotopy Continuation Method in Tracking	Commun. Inf. System			2014
Lin, Wen-Wei	A Novel Symmetric Skew-Hamiltonian Isotropic Lanczos Algorithm for Spectral Conformal Parameterizations	J. Sci. Comput.			2014
Lin, Wen-Wei	Eigenvalue Solvers for Three Dimensional Photonic Crystals with Face-Centered Cubic Lattices	J. Comp. Appl. Math.			2014
Lin, Wen-Wei	High Performance Computing for Spherical Conformal and Riemann Mappings	Geom. Imag. Comput.			2014
Lin, Wen-Wei	New Solvers for Higher Dimensional Poisson Equations by Reduced B-Splines	Num. Method for PDE			2014
Lin, Wen-Wei	A Robust Numerical Algorithm for Computing Maxwell's Transmission Eigenvalue Problems	SIAM Sci. Comp.			2015
Lin, Wen-Wei	Backward Perturbation Analysis and Residual-Based Error Bounds for the Linear Response Eigenvalue Problem	BIT Numer. Math.			2015
Lin, Wen-Wei	A Positivity Inexact Noda Iteration for Computing the Smallest Eigenpair of a Large Irreducible M-Matrix	Numer. Math.			2015
Lin, Wen-Wei	On Spectral Analysis and a Novel Algorithm for Transmission Eigenvalue Problems	J. Sci. Comput.			2015
Lin, Wen-Wei	Singular Value Decompositions for Single-Curl Operators in Three-Dimensional Maxwell's Equations for Complex Media	SIAM Matrix Anal. Appl.			2015
Lin, Wen-Wei	A Null Space Free Jacobi-Davidson Iteration for Maxwell's Operator	SIAM Sci. Comp.			2015
Lin, Wen-Wei	A Hybrid Jacobi-Davidson Method for Interior Cluster Eigenvalues with Large Null-Space in Three Dimensional Lossless Drude Dispersive Metallic Photonic Crystals	Comp. Phys. Commun.			2016
Lin, Wen-Wei	A Fast Algorithm for Fast Train Palindromic Quadratic Eigenvalue Problems	SIAM Sci. Comp.	Y		2016

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Lin, Wen-Wei	Linear Response Eigenvalue Problem Solved by Extended Locally Optimal Preconditioned Conjugate Gradient Methods	Sci. China Math.			2016
Lin, Wen-Wei	Structure-Preserving Flows of Sympletic Matrix Pairs	SIAM Matrix Anal. Appl.			2016
Lin, Wen-Wei	A Positivity Preserving Inverse Iteration for Finding the Perron Pair of an Inreducible Nonnegative Third Order Tensor	SIAM Matrix Anal. Appl.			2016
Lin, Wen-Wei	Stochastic Growth Dynamics and Composite Defects in Quenched Immiscible Binary Condensates	Phys. Rev. A.			2016
Lin, Wen-Wei	A Newton-Type Method with Non-equivalence Deflation for Nonlinear Eigenvalue Problems Arising in Photonic Crystal Modeling	SIAM Sci. Comp.?			2016
Lin, Wen-Wei	A New Two-Phase Structure-Preserving Doubling Algorithm for Critically Singular M-Matrix Algebraic Riccati Equations	Num. Lin. Alg. Appl.			2016
Liou, Jia-Ming (Frank)	Equivariant cohomology of infinite-dimensional Grassmannian and shifted Schur functions	Math. Res. Lett.			2012
Liou, Jia-Ming (Frank)	Moduli spaces and Grassmannian	Lett. Math. Phys.			2013
Liou, Jia-Ming (Frank)	Weierstrass cycles and tautological rings in various moduli spaces of algebraic curves	J. Fixed Point Theory Appl.			2015
Liou, Jia-Ming (Frank)	Weierstrass cycles in moduli spaces and the Krichever map				preprint
Liou, Jia-Ming (Frank)	Explicit solutions to the mean field equations on hyperelliptic curves of genus two		Y	Y	preprint
Peng, Yung-Ning	Finite W-superalgebras and truncated super Yangians	Letters in Mathematical Physics			2014
Peng, Yung-Ning	Super tableaux and a branching rule for the general linear Lie superalgebra	Linear and Multilinear Algebra			2014
Peng, Yung-Ning	On shifted super Yangians and a class of finite W-superalgebras	Journal of Algebra			2015
Peng, Yung-Ning	Parabolic presentations of the super Yangian Y (glM—N) associated with arbitrary 01-sequences	Communications in Mathematical Physics	Y		2016
Shen, Chun-Yen	Harmonic analysis related to homogeneous varieties in three dimensional vector spaces over finite fields	Canadian J. Math.			2012
Shen, Chun-Yen	The generalized Erdos-Falconer distance problems in vector spaces over finite fields elds,	Number Theory.			2012
Shen, Chun-Yen	Sharp extension theorems and Falconer distance problems for algebraic curves in two dimensional vector spaces over finite fields	Revista Matem- atica Iberoamericana			2012
Shen, Chun-Yen	Algebraic methods in sum-product phenomena	Israel J. Math.			2012
Shen, Chun-Yen	Fourier analysis and expanding phenomena in finite fields	Proc. Amer. Math. Soc.			2013
Shen, Chun-Yen	Two weight inequality for the Hilbert transform: A real variable characterization	Duke Math J			2014
Shen, Chun-Yen	A note on failure of energy reversal for classical fractional singular integrals	International Mathematics Research Notices,			2015
Shen, Chun-Yen	Averaging operators over homogeneous varieties over nite elds	The Journal of Geometric Analysis, Issue			2016
Shen, Chun-Yen	A two weight theorem for fractional singular integrals with an energy condition	Revista Matematica Iberoamericana, Issue			2016
Shen, Chun-Yen	A two weight fractional singular integral theorem with side conditions, energy and k-energy dispersed	Springer Volume on Harmonic Analysis, Partial Di erential Equations, Banach Spaces, and Operator Theory			2017

Author	Title	Journal	Ack	AFF	Year
Sheu, Yuan-Chung	On optimal stopping problems for matrix-exponential L\'evy processes. Journal of Applied Probability	Journal of Applied Probability	Y		2012
Sheu, Yuan-Chung	The cutoff phenomenon for Ehrenfest chains. Stochastic Processes and Their Applications	Stochastic Processes and Their Applications	Y		2012
Sheu, Yuan-Chung	On optimal stopping problems for matrix-exponential L\'evy processes	Journal of Applied Probability	Y		2012
Sheu, Yuan-Chung	The cutoff phenomenon for Ehrenfest chains	Stochastic Processes and Their Applications	Y		2012
Sheu, Yuan-Chung	A note on Gerber-Shiu function for hyper-exponential jump-diffusion processes	Elect. Comm. in Probab.	Y		2013
Sheu, Yuan-Chung	Free boundary problems and perpetual American strangles	Quantitative Finance?	Y		2013
Sheu, Yuan-Chung	A note on Gerber-Shiu function for hyper-exponential jump-diffusion processes	Elect. Comm. in Probab.	Y		2013
Sheu, Yuan-Chung	Free boundary problems and perpetual American strangles	Quantitative Finance?	Y		2013
Sheu, Yuan-Chung	Disorder chaos in the spherical mean-field model	Journal of Statistical Physics?	Y		2015
Sheu, Yuan-Chung	Pricing perpetual American compound options under a matrix-exponential jump-diffusion model	Applied Mathematical Finance	Y		2015
Sheu, Yuan-Chung	Disorder chaos in the spherical mean-field model	Journal of Statistical Physics	Y		2015
Sheu, Yuan-Chung	Pricing perpetual American compound options under a matrix-exponential jump-diffusion model	Applied Mathematical Finance	Y		2015
Sheu, Yuan-Chung	The L2-cutoff of reversible Markov chains		Y	Y	preprint
Spector, Daniel E.	Corrigendum to "Characterization of Sobolev and BV spaces"	J. Funct. Anal.			2014
Spector, Daniel E.	On the role of Riesz potentials in Poisson's equation and Sobolev embeddings	Indiana Univ. Math. J.			2015
Spector, Daniel E.	Lp theory for fractional gradient PDEs with VMO coefcients	Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur.			2015
Spector, Daniel E.	Analysis and Application of a Nonlocal Hessian	SIAM J. Imaging Sci.			2015
Spector, Daniel E.	On regularity of solutions to Poisson's equation	C. R. Math. Acad. Sci. Paris			2015
Spector, Daniel E.	Lp-Taylor approximations characterize the Sobolev space W1,p	C. R. Math. Acad. Sci. Paris			2015
Spector, Daniel E.	Localization of Nonlocal Gradients in Various Topologies	Calc. Var. Partial Di erential Equations			2015
Spector, Daniel E.	On a new class of fractional partial differential equations	Adv. Calc. Var.			2015
Spector, Daniel E.	On a generalization of Lp-differentiability erentiability	Calc. Var. Partial Di erential Equations			2016
Spector, Daniel E.	An L1-type estimate for Riesz potentials	Rev. Mat. Iberoam.			2017
Spector, Daniel E.	On a new class of fractional partial differential equations II	Adv. Calc. Var.		Y	to appear
Spector, Daniel E.	A Remark on an Integral Characterization of the Dual of BV	J. Math. Anal. Appl.	Y		
Spector, Daniel E.	Regularity for a fractional p-Laplace's equation	Commun. Contemp. Math.			to appear
Spector, Daniel E.	On formulae decoupling the total variation of BV functions	Nonlinear Anal.			to appear

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Tsai, Chung-Jun	Symplectic cohomologies on phase space	J. Math Phys.		Y	2012
Tsai, Chung-Jun	Asymptotic spectral flow for Dirac operators of disjoint Dehn twists	Asian J. Math.	Y	Y	2014
Tsai, Chung-Jun	Cohomology and Hodge theory on symplectic manifolds: III	J. Differential Geom	Y		2016
Tsai, Chung-Jun	Dirac spectral flow on contact three manifolds II: Thurston–Winkelnkemper contact forms	Adv. Math.			2016
Tsai, Chung-Jun	Dirac spectral flow on contact three manifolds I: eigensection estimates and spectral asymmetry	J. Symplectic Geom.			2017
Tsai, Chung-Jun	Mean curvature flows in manifolds of special holonomy	J. Differential Geom	Y		to appear
Tsai, Dong-Ho	Contracting covex immersed closed plane curves with slow speed of curvature	Transactions of AMS	Y		2012
Tsai, Dong-Ho	Application of Andrews and Green-Osher inequalities to nonlocal flow of convex plane curves	Jounal of Evolution Equations	Y		2012
Tsai, Dong-Ho	Remarks on some isoperimetric properties of the k-1 flow	Pacific J of Math		Y	2012
Tsai, Dong-Ho	Asymptotic behavior of the isoperimetric deficit for expanding convex plane curves	Jounal of Evolution Equations		Y	2014
Tsai, Dong-Ho	On a Nonlinear Parabolic Equation Arising from Anisotropic Plane Curve Evolution	Journal of Differential Equations			2015
Tsai, Dong-Ho	On Length-preserving and Area-preserving Nonlocal Flow of Convex Closed Plane Curves	Calculus of Variations & PDEs			2015
Tsai, Dong-Ho	On a Third Order Flow of Convex Closed Plane Curves	Taiwanese Journal of Mathematics			2016
Tsai, Je-Chiang	Front-like entire solutions for equations with convection	Journal of Differential Equations	Y		2012
Tsai, Je-Chiang	Traveling waves in a simplified model of calcium dynamics	SIAM Journal on Applied Dynamical Systems	Y		2012
Tsai, Je-Chiang	Do calcium buffers always slow down the propagation of calcium waves?	Journal of Mathematical Biology	Y		2013
Tsai, Je-Chiang	Curvature dependence of propagating velocity for a simplified calcium model	SIAM Journal on Applied Mathematics	Y		2014
Tsai, Je-Chiang	Wave propagation in the predator-prey systems	Nonlinearity	Y	Y	2015
Tsai, Je-Chiang	*Stationary waves on the sphere*	SIAM Journal on Applied Mathematics	Y	Y	2015
Tsai, Je-Chiang	Regularity of solutions to a reaction-diffusion equation on the sphere: the Legendre series approach	Mathematical Methods in the Applied Sciences	y	Y	2017
Tsui, Mao-Pei	Soliton solutions for the Laplacian co-flow of some G2-structures with symmetry	Differential Geometry and its Applications			2012
Tsui, Mao-Pei	Stability of the minimal surface system and convexity of area functional	Transactions of the American Mathematical Society			2014
Tsui, Mao-Pei	Curvature decay estimates of graphical mean curvature flow in higher codimensions	Trans. Amer. Math. Soc.	Y		2016
Tsui, Mao-Pei	Generalized Lagrangian mean curvature flows: the cotangent bundle case	Journal fLur die reine und angewandte Mathematik	Y	Y	2016

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Wang, Feng-Bin	Threshold dynamics of an infective disease model with a fixed latent period and non-local infections	Journal of Mathematical Biology			2012
Wang, Feng-Bin	Competition between microorganisms for a single limiting resource with cell quota structure and spatial variation	Journal of Mathematical Biology		Y	2012
Wang, Feng-Bin	Global Dynamics of Zooplankton and Harmful Algae in Flowing Habitats	Journal of Differential Equations		Y	2013
Wang, Feng-Bin	Competition and allelopathy with resource storage: Two resources		Y		2014
Wang, Feng-Bin	On a nonlocal reactionVdiffusionVadvection system modelling the growth of phytoplankton with cell quota structure	Journal of Differential Equations		Y	2015
Wang, Feng-Bin	A Reaction-Diffusion-Advection Model of Harmful Algae Growth with Toxin Degradation	Journal of Differential Equations		Y	2015
Wang, Feng-Bin	A pivotal eigenvalue problem in river ecology	Journal of Differential Equations			2015
Wang, Feng-Bin	Competition for two essential resources with internal storage and periodic input	Differential and Integral Equations	Y		2016
Wang, Feng-Bin	Varying total population enhances disease persistence: Qualitative analysis on a diffusive SIS epidemic model	Journal of Differential Equations			2017
Wang, Feng-Bin	Single species growth consuming inorganic carbon with internal storage in a poorly mixed habitat	Journal of Mathematical Biology	Y		preprint
Wang, Jenn-Nan	Quantitative uniqueness estimate for the Maxwell system with Lipschitz anisotropic media	Proc AMS			2012
Wang, Jenn-Nan	Tomography of small residual stresses	Inverse Problems			2012
Wang, Jenn-Nan	Quantitative uniqueness estimates for the shallow shell system and their application to an inverse problem	Ann. Sc. Norm. Super. Pisa Cl. Sci		Y	2013
Wang, Jenn-Nan	Increasing stability in an inverse problem for the acoustic equation	Inverse Problems		Y	2013
Wang, Jenn-Nan	Detecting a general inclusion in the shallow shell	SIAM J Math Anal.		Y	2013
Wang, Jenn-Nan	Doubling inequalities for anisotropic plate equations and size estimates of inclusions	Inverse Problems			2013
Wang, Jenn-Nan	Bounds on the volume fraction of the twophase shallow shell using one measurement	J. of Elasticity		Y	2014
Wang, Jenn-Nan	Quantitative uniqueness estimates for the general second order elliptic equations	J. of Funct. Anal		Y	2014
Wang, Jenn-Nan	Increasing stability of the inverse boundary value problem for the SchrLodinger equation	Contemporary Mathematics			2014
Wang, Jenn-Nan	Estimate of an inclusion in a body with discontinuous conductivity	Bull. Inst. Math. Academia Sinica, New Series (Special issue dedicated to Neil Trudingers 70th birthday)		Y	2014
Wang, Jenn-Nan	Increasing stability for determining the potential in the Schr?dinger equation with attenuation from the Dirichlet-to-Neumann map	Inverse Problems and Imaging		Y	2014
Wang, Jenn-Nan	Inverse boundary value problem for the Stokes and the Navier-Stokes equations in the plane	Arch. Rational Mech. Anal.			2015
Wang, Jenn-Nan	On Landis conjecture in the plane	Comm PDE		Y	2015
Wang, Jenn-Nan	Quantitative uniqueness estimates for second order elliptic equations with unbounded drift	Math. Research Letters		Y	2015
Wang, Jenn-Nan	Increasing stability for the conductivity and attenuation coefficients	SIAM J Math Anal			2016
Wang, Jenn-Nan	Carleman estimate for second order elliptic equations with Lipschitz leading coefficients and jumps at an interface	J. Math. Pures Appl			2016
Wang, Jenn-Nan	Three-region inequalities for the second order elliptic equation with discontinuous coefficients and size estimate	J. Diff. Equa.			2016

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Wang, Jenn-Nan	Doubling inequalities for the Lame system with rough coefficients	Proc AMS		Y	2016
Wang, Jenn-Nan	Unique continuation for the elasticity system and a counterexample for second order elliptic systems			Y	preprint
Wang, Jenn-Nan	The Landis Conjecture for variable coefficient second-order elliptic PDEs				preprint
Wang, Jenn-Nan	Uniqueness for the two dimensional Calderons problem with unbounded conductivities			Y	preprint
Wang, Weichung	Accelerating Parallel Particle Swarm Optimization via GPU	Optimization Methods and Software			2012
Wang, Weichung	Rotational Quotient Procedure: a Tracking Control Continuation Method for PDEs on Radially Symmetric Domains	Computer Physics Communications	Y		2012
Wang, Weichung	Accelerating Image Reconstruction in Dual-Head PET System by GPU and Symmetry Properties	PLOS ONE			2012
Wang, Weichung	On the Multiple Spike Solutions for Singularly Perturbed Elliptic Systems	Discrete and Continuous Dynamical Systems-Series B			2013
Wang, Weichung	Optimizing Latin Hypercube Designs by Particle Swarm	Statistics and Computing	Y		2013
Wang, Weichung	Computing Extremal Eigenvalues for Three-Dimensional Photonic Crystals with Wave Vectors Near the Brillouin Zone Center	Journal of Scientific Computing	Y		2013
Wang, Weichung	Matrix Representation of the Double-Curl Operator for Simulating Three Dimensional Photonic Crystals	Mathematical and Computer Modelling	Y		2013
Wang, Weichung	Contour Estimation Via Two Fidelity Computer Simulators Under Limited Resources	Computational Statistics	Y		2013
Wang, Weichung	Eigendecomposition of the Discrete Double-Curl Operator with Application to Fast Eigensolver for Three Dimensional Photonic Crystals	Journal on Matrix Analysis and Applications	Y		2013
Wang, Weichung	Discrete Particle Swarm Optimization for Constructing Uniform Design on Irregular Regions	Computational Statistics and Data Analysis	Y		2014
Wang, Weichung	Performance Models and Workload Distributions for Optimizing a Hybrid CPU-GPU Multifrontal Solver	Computers and Mathematics with Applications	Y		2014
Wang, Weichung	Eigenvalue Solvers for Three Dimensional Photonic Crystals with Face-Centered Cubic Lattice	Journal of Computational and Applied Mathematics	Y		2014
Wang, Weichung	Adaptive Block Size for Dense QR Factorization in Hybrid CPU-GPU Systems via Statistical Modeling	Parallel Computing	Y		2014
Wang, Weichung	Using Animal Instincts to Design Efficient Biomedical Studies	Swarm and Evolutionary Computation	Y		2014
Wang, Weichung	Effective Anatomical Priors for Emission Tomographic Reconstruction	Journal of Medical and Biological Engineering			2015
Wang, Weichung	Minimax Optimal Designs via Particle Swarm Optimization Methods	Statistics and Computing	Y		2015
Wang, Weichung	A Complete Study of the Ground State Phase Diagrams of Spin-1 Bose-Einstein Condensates in a Magnetic Field via Continuation Methods	Journal of Scientific Computing	Y		2015
Wang, Weichung	Singular Value Decompositions for Single-Curl Operators in Three-Dimensional Maxwell's Equations for Complex Media	SIAM Journal on Matrix Analysis and Applications	Y		2015
Wang, Weichung	A Modified Particle Swarm Optimization Technique for Finding Optimal Designs for Mixture Models	PLOS ONE	Y		2015
Wang, Weichung	Optimizing Two-level Supersaturated Designs by Particle Swarm	Technometrics			2016
Wang, Weichung	Sequential Designs Based on Bayesian Uncertainty Quantification in Sparse Representation Surrogate Modeling	Technometrics			2016
Wang, Weichung	A Hybrid Jacobi-Davidson Method for Interior Cluster Eigenvalues with Large Null-Space in Three Dimensional Lossless Drude Dispersive Metallic Photonic Crystals	Computer Physics Communications			2016

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Wei, Fu-Tsun	Mass formula of division algebras over global function ?elds	Journal of Number Theory			2012
Wei, Fu-Tsun	On metaplectic forms over function ?elds	Mathmatische Annalen Volume	Y		2013
Wei, Fu-Tsun	On Rankin triple product L-functions over function ?elds: central critical values	Mathematische Zeitschrift			2014
Wei, Fu-Tsun	Class numbers of central simple algebras over global function ?elds	International Mathematics Research Notices			2015
Wei, Fu-Tsun	Brandt matrices and theta series over global function ?elds	Memoirs of the American Mathematical Society	Y		2015
Wei, Fu-Tsun	The Eisenstein ideal and Jacquet-Langlands isogeny over function ?elds	Documenta Mathematica	Y		2015
Wei, Fu-Tsun	On the Siegel-Weil formula over function ?elds	The Asian Journal of Mathematics			2015
Wei, Fu-Tsun	On the Eisenstein ideal over function ?elds, Journal of Number Theory	Special issue in honor of Winnie Li			2016
Wei, Fu-Tsun	The rational torsion subgroups of Drinfeld modu-lar Jacobians and Eisenstein pseudo-harmonic cochains	Mathematische Zeitschrift			2016
Wei, Fu-Tsun	Kronecker limit formula over global function ?elds	American Journal of Mathematics			to appear
Wei, Fu-Tsun	n central critical values of Rankin-type L-functions over global function ?elds	Proceedings of London Mathematical Society			to appear
Wei, Fu-Tsun	Waldspurger formula over function ?elds	Transcations of the American Mathematical Society			to appear
Wu, Kung-Chien	Hydrodynamic limits of the nonlinear Klein-Gordon equation	J. Math. Pures Appl.			2012
Wu, Kung-Chien	Low Froude number limit of the rotating shallow water and Euler equations	Proc. Amer. Math. Soc.			2014
Wu, Kung-Chien	Global in time estimates for the spatially homogeneous Landau equation with soft potentials	J. Funct. Anal			2014
Wu, Kung-Chien	Pointwise Behavior of the Linearized Boltzmann Equation on a Torus	SIAM J. Math. Anal			2014
Wu, Kung-Chien	An incompressible limit for a Navier-Stokes system with capillary effects	Comm. in Math. Phys			2014
Wu, Kung-Chien	Nonlinear stability of the Boltzmann Equation in a periodic box	J. Math. Phys	Y	Y	2015
Wu, Kung-Chien	Pointwise discription for the linearized Fokker-Planck-Boltzmann Model	J. Stat. Phys	Y		2015
Wu, Kung-Chien	Semigroup Decay of the Linearized Boltzmann Equation in a Torus	J. Differential Equations	Y	Y	2016
Wu, Kung-Chien	Cauchy problem and exponential stability for the inhomogeneous Landau equation	Arch. Rational Mech. Anal	Y	Y	2016
Xia, Eugene Zhu	Dehn twists and invariant classes	Proc. Amer. Math. Soc		Y	2012
Xia, Eugene Zhu	Action of the Johnson-Torelli group on representation varieties	Proc. Amer. Math. Soc.		Y	2012
Xia, Eugene Zhu	The algebraic de Rham cohomology of representation varieties	Canad. J. Math.		Y	to appear
Xia, Eugene Zhu	The algebraic de Rham cohomology of representation varieties				preprint

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Yang, Suh-Yuh	Analysis of a new stabilized finite element method for the reaction-convection-diffusion equations with a large reaction coefficient	Computer Methods in Applied Mechanics and Engineering			2012
Yang, Suh-Yuh	Analysis of the permanence of an SIR epidemic model with logistic process and distributed time delay	Communications in Nonlinear Science and Numerical Simulation			2012
Yang, Suh-Yuh	Computation of Maxwell singular solution by nodal-continuous elements	Journal Computational Physics			2014
Yang, Suh-Yuh	Error and attack tolerance of synchronization in Hindmarsh-Rose neural networks with community structure	Physics Letters A			2014
Yang, Suh-Yuh	A high-accuracy finite difference scheme for solving reaction-convection-diffusion problems with a small diffusivity	Advances in Applied Mathematics and Mechanics			2014
Yang, Suh-Yuh	Analysis of epidemic spreading of an SIRS model in complex heterogeneous networks	Communications in Nonlinear Science and Numerical Simulation			2014
Yang, Suh-Yuh	Analysis of the small viscosity and large reaction coefficient in the computation of the generalized Stokes 2 problem by a novel stabilized finite element method	Computer Methods in Applied Mechanics and Engineering			2014
Yang, Suh-Yuh	Effect of permeability-porosity functions on simulated morphological evolution of a chemical dissolution front in a fluid-saturated porous medium	Hydrological Processes			2014
Yang, Suh-Yuh	Eventual dissipativeness and synchronization of nonlinearly coupled dynamical network of Hindmarsh-Rose neurons	Applied Mathematical Modelling			2015
Yang, Suh-Yuh	An SPD stabilized finite element method for Stokes equations	IMA Journal of Numerical Analysis			2015
Yang, Suh-Yuh	Effects of network structure on the synchronizability of nonlinearly coupled Hindmarsh-Rose neurons	Physics Letters A			2015
Yang, Suh-Yuh	An unconditionally energy stable penalty immersed boundary method for simulating the dynamics of an inextensible interface interacting with a solid particle	Journal of Scientific Computing			2015
Yang, Suh-Yuh	A new stabilized linear finite element method for solving reaction-convection-diffusion equations	Computer Methods in Applied Mechanics and Engineering	Y		2016
Yang, Suh-Yuh	A novel technique for constructing difference schemes for systems of singularly perturbed equations	Communications in Computational Physics	Y		2016
Yang, Suh-Yuh	A new discrete Cucker-Smale flocking model under hierarchical leadership	Discrete and Continuous Dynamical Systems-Series B	Y		2016
Yang, Yifan	A basis for Sk(F0(4)) and representations of integers as sums of squares	The Ramanujan Journal		Y	2012
Yang, Yifan	Jacobsthal identity for Q(sqrt(-2))	Forum Mathematicum	Y	Y	2012
Yang, Yifan	Lattice packing from quaternion algebras	RIMS Kokyuroku Bessatsu		Y	2012
Yang, Yifan	Schwarzian differential equation and automorphic forms on Shimura curves	Compositio Math		Y	2013
Yang, Yifan	Algebraic transformations of hypergeometric functions and automorphic forms on Shimura curves	Trans. Amer. Math. Soc.		Y	2013
Yang, Yifan	A basis for and formulas for even powers of the Jacobi theta function	Int. J. Number Theory		Y	2013
Yang, Yifan	Modular forms of half-integral weights on SL(2,Z)	Nagoya Math. J.		Y	2014
Yang, Yifan	Ramanujan-type identities for Shimura curves	Israel J. Math.		Y	2014
Yang, Yifan	Equations of hyperelliptic Shimura curves	Compositio Math.		Y	to appear
Yang, Yifan	Computing modular equations for Shimura curves			Y	preprint

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Yu, Chia-Fu	On Hermitian forms over dyadic non-maximal local orders	Pure Appl. Math. Q		Y	2012
Yu, Chia-Fu	Superspecial abelian varieties over finite prime fields	J. Pure Appl. Algebra		Y	2012
Yu, Chia-Fu	Mass formula of division algebras over global function fields	J. Number Theory		Y	2012
Yu, Chia-Fu	Embeddings of fields into simple algebras: generalizations and applications	J. Algebra		Y	2012
Yu, Chia-Fu	he supersingular locus in Siegel modular varieties with Iwahori level structure	Math. Ann		Y	2012
Yu, Chia-Fu	Characteristic polynomials of central simple algebras. Taiwanese	J. Math		Y	2013
Yu, Chia-Fu	Endomorphism algebras of QM abelian surfaces	J. Pure App. Algebra		Y	2013
Yu, Chia-Fu	Shuffle structures on KR strata. MFO Workshop on Reductions of Shimura Varieties	Math. F. Oberwolfach Report		Y	2013
Yu, Chia-Fu	Embeddings of fields into simple algebras over global fields	Asian J. Math		Y	2014
Yu, Chia-Fu	Jiangwei Xue and C.-F. Yu*, Fixed points and homology of superelliptic Jacobians	Math. Z.		Y	2014
Yu, Chia-Fu	Notes on density of the ordinary locus	Bull. Inst. Math. Acad. Sin. (N.S.)		Y	2014
Yu, Chia-Fu	Endomorphism algebras of factors of certain hypergeometric Jacobians	Trans. Amer. Math. Soc		Y	2015
Yu, Chia-Fu	Abelian varieties without a prescribed Newton polygon reduction	Proc. Amer. Math. Soc		Y	2015
Yu, Chia-Fu	Class numbers of central simple algebras over global function fields	Int. Math. Res. Not		Y	2015
Yu, Chia-Fu	Monomial, Gorenstein and Bass orders	J. Pure Appl. Algebra		Y	2015
Yu, Chia-Fu	Variants of mass formulas for definite division algebras	J. Algebra		Y	2015
Yu, Chia-Fu	A Note on the Mumford-Tate conjecture for CM abelian varieties	Taiwanese J. Math		Y	2015
Yu, Chia-Fu	On existence and density of the ordinary locus of certain Shimura varieties	Proceedings of the 6th International Congress of Chinese Mathematicians		Y	2016
Yu, Chia-Fu	Numerical Invariants of Totally Imaginary Quadratic Z[\sqrtp]-orders	Taiwanese J. Math		Y	2016
Yu, Chia-Fu	On non-emptiness of basic loci of Shimura varieties. MFO Workshop on Reductions of Shimura Varieties	Math. F. Oberwolfach Report		Y	2016
Yu, Chia-Fu	Abelian varieties over finite fields as basic abelian varieties	Forum Math		Y	2017
Yu, Chia-Fu	On arithmetic of the superspecial locus	Indiana Univ. Math. J.		Y	2017
Yu, Chia-Fu	Notes on locally free class groups	Bull. Inst. Math. Acad. Sin.		Y	preprint
Yu, Chia-Fu	On fields of definition of components of the Siegel supersingular locus	Proc. Amer. Math. Soc.		Y	preprint
Yu, Jeng-Daw	Special lifts of ordinary K3 surfaces and applications	Pure and Applied Mathematics Quarterly			2012
Yu, Jeng-Daw	Irregular Hodge filtration on twisted de Rham cohomology	Manuscripta Mathematica	Y		2014
Yu, Jeng-Daw	On the irregular Hodge filtration of exponentially twisted mixed Hodge modules	Forum of Mathematics, Sigma	Y		2015
Yu, Jeng-Daw	E1-degeneration of the irregular Hodge filtration (with an appendix by Morihiko Saito)	Journal fur die reine und angewandte Mathematik	Y		2015