National Center for Theoretical Sciences

Short Course on
Finite Element Method (FEM)

Time	10:00 -11:30, 13:30- 15:00, every Monday, Wednesday, and Friday, June 17 - June 28, 2024
Venue	M210, Department of Mathematics, NTNU

Speaker **So-Hsiang Chou** Bowling Green State University

Organizers

Wei-Fan Hu (NCU) **Matthew M. Lin** (NCKU)
Tsung-Ming Huang (NTNU) **Ming-Cheng Shiue** (NYCU)
Yueh-Cheng Kuo (NCCU)

Introduction & Purposes

Introduction of some fundamental concepts in numerical partial differential equations in connection to functional analysis, approximation theory, and algorithm implementation by MATLAB. It is hoped that after this short course the students can go on studying linear and nonlinear models in elasticity, fluid mechanics, and electromagnetics.

Outline & Descriptions

1. Get students familiar with many fundamental aspects of partial differential equations and modeling.
2. Learn to implement numerical algorithms using the numerical software MATLAB and its PDE-Toolbox.

Week 1: Review of Standard elliptic and parabolic equations and their associated numerical schemes; Concepts of stability, convergence, and consistency; Comparison of FDM and FEM using MATLAB toolboxes.
Week 2: Interface Problems arising from nonuniform material properties and their associated numerical schemes, e.g., IFE, SGFEM, and relevant penalty methods.
Week 3: Interface problems with nonlinear interface conditions or nonlinear reaction terms.

Prerequisites

Familiarity with advanced calculus, linear algebra, elementary partial differential equations.

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Registration (deadline: June 12)