THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF APPLIED MATHEMATICS
應 用 數 學 系

Department of Applied Mathematics
Seminar

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Topic

Weak Galerkin finite element method for unsteady convection diffusion equation

Date| Time

30th January 2024 (Tuesday) | 4:00pm – 5:00pm (HK Time)

Venue

QR512, Main Campus

Abstract

In this talk, I will explore how a Crank-Nicolson weak Galerkin finite element method (WG-FEM) effectively tackles the singularly perturbed unsteady convection-diffusion equation with a nonlinear reaction term in a two-dimensional context. Beginning with the model problem, I will establish asymptotic behavior results for the exact solution and its derivatives concerning a specific parameter. We employ a tensor product, Shishkin mesh, characterized by piece-wise discontinuous bilinear polynomials to handle layers within the solution, ensuring uniform convergence across various parameter values. Utilizing this setup, we will derive an error estimate for the vertex-edge-cell interpolation of the true solution against the WG solution. This estimate will showcase the optimal uniform convergence order for semi-discrete and fully discrete schemes. To conclude, I will present numerical experiments that validate the proposed method's optimal order of convergence.

ALL ARE WELCOME