THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Discontinuous Galerkin schemes for the Maxwell equation and applications

By

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Abstract

In the first part of this talk, we introduce a hybrid discontinuous Galerkin (HDG) method solving the indefinite time-harmonic Maxwell equations. First, we derive the wavenumber explicit regularity result, which plays an important role in the error analysis for the HDG method. Second, we prove a discrete inf-sup condition which holds for all positive mesh size h, for all wavenumber k, and for general domain Ω. Then, we establish the optimal order error estimates of the underlying HDG method with constants independent of the wavenumber. In the second part of this talk, we build up a slightly more expensive but self-consistent hydrodynamic Drude model (SCHDM) to include the electron spill-out and tunneling effects for small metallic nanostructures. This is achieved by revisiting the semi-classical Hamiltonian of the electron system and employing a non-uniform electron distribution which is consistent with the energy functional we used in the model. For this SCHDM, we define its energy and show its energy-decaying property on the continuous level, and then design a discontinuous Galerkin (DG) scheme for its numerical solutions. Stability and error estimates are derived for the DG scheme. Finally, numerical tests will be presented for the validation of the above new model and schemes.

Date	**:**	**23 July 2024 (Tuesday)**
Time	**:**	**3:00pm - 4:00pm**
Venue	**:**	**Room 2302 (Lift 17/18)**

All are Welcome!