



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學



DEPARTMENT OF APPLIED MATHEMATICS

應用數學系

**The Hong Kong Polytechnic University
Department of Applied Mathematics**

Colloquium

**A CIP-FEM for high-frequency scattering problem
with the truncated DtN boundary condition**

By

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Abstract

A continuous interior-penalty finite element method (CIP-FEM) is proposed to solve high-frequency Helmholtz scattering problems by an impenetrable obstacle in two dimensions. To formulate the problem on a bounded domain, a DtN boundary condition is proposed on the outer boundary by truncating the Fourier series of the original DtN mapping into finite terms. Assuming the truncation order $N > kR$, the H^j -stabilities, $j=0,1,2$, are established for both forward and dual problems, with explicit and sharp estimates of the upper bounds with respect to the wave number k . Under the condition that k^3h^2 is sufficiently small, we prove that the pre-asymptotic error estimates for the linear CIP-FEM as well as the linear continuous FEM are $C(kh+k^3h^2)$. Numerical experiments are presented to validate the theoretical results.

Date : 21 October, 2020 (Wednesday)

Time : 14:00-15:00 (Hong Kong Standard Time GMT +8)

Venue : Online Talk via Zoom(Meeting ID: 92776975040)

Speaker: Prof. ZHENG Weiyang, Academy of Mathematics and Systems Science, Chinese Academy of Sciences

Host: Dr. Li Buyang, The Hong Kong Polytechnic University

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