THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Spherical configurations and quadrature methods for integral equations of the second kind

By

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Abstract

We propose and analyze a product integration method for the second-kind integral equation with weakly singular and continuous kernels on the unit sphere . We employ quadrature rules that satisfy the Marcinkiewicz--Zygmund property to construct hyperinterpolation for approximating the product of the continuous kernel and the solution, in terms of spherical harmonics. By leveraging this property, we significantly expand the family of candidate quadrature rules and establish a connection between the geometrical information of the quadrature points and the error analysis of the method. We then utilize product integral rules to evaluate the singular integral with the integrand being the product of the singular kernel and each spherical harmonic. We derive a practical error bound, which consists of two terms: one controlled by the best approximation of the product of the continuous kernel and the solution, and the other characterized by the Marcinkiewicz--Zygmund property and the best approximation polynomial of this product. Numerical examples validate our numerical analysis.

Date : **06 February 2026 (Friday)**

Time : **10:00a.m. - 11:00a.m.**

Venue : **Room 3598 (Lift 27/28)**

All are Welcome!