



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

**Can hyperinterpolation part with
quadrature exactness?**

By

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Abstract

We discuss the approximation of continuous functions on the unit sphere by spherical polynomials of degree n via hyperinterpolation. Hyperinterpolation of degree n is a discrete approximation of the L_2 -orthogonal projection of degree n with its Fourier coefficients evaluated by a positive-weight quadrature rule that exactly integrates all spherical polynomials of degree at most $2n$. This talk aims to bypass this quadrature exactness assumption by replacing it with the Marcinkiewicz--Zygmund property. Consequently, hyperinterpolation can be constructed by a positive-weight quadrature rule--not necessarily with quadrature exactness. This scheme is called unfettered hyperinterpolation. We provide a reasonable error estimate for unfettered hyperinterpolation. The error estimate generally consists of two terms: a term representing the error estimate of the original hyperinterpolation of full quadrature exactness and another introduced as compensation for the loss of exactness degrees. A guide to controlling the newly introduced term in practice is provided. In particular, if the quadrature points form a quasi-Monte Carlo design, then there is a refined error estimate. Numerical experiments verify the error estimates and the practical guide.

Date : 28 October 2024 (Monday)

Time : 10:00a.m.

Venue : Room 4503 (Lift 25/26)

All are Welcome!