



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Linear convergence of Gearhart-Koshy accelerated
Kaczmarz methods for tensor linear systems

By

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Abstract

The generalized Gearhart-Koshy acceleration is a recent exact affine search technique designed for the method of cyclic projections onto hyperplanes, i.e., the Kaczmarz method. However, its convergence properties, particularly the linear convergence rate, have not been thoroughly established. In this talk, we systematically establish the linear convergence of the generalized Gearhart-Koshy accelerated Kaczmarz method for tensor linear systems, proving that it converges linearly to the unique least-norm solution. Our analysis is general and applies to several popular Kaczmarz variants, including incremental, shuffle-once, and random-reshuffling schemes, and demonstrates that this acceleration approach yields a better convergence upper bound compared to the plain Kaczmarz method. We also propose an efficient Gram-Schmidt-based implementation that computes the next iterate in linear time. Building on this implementation, we establish a connection between this acceleration framework and Arnoldi-type Krylov subspace methods, further highlighting its efficiency and potential. Our theoretical results are supported by numerical experiments.

Date : 21 May 2026 (Thursday)

Time : 4:00p.m.-5:00p.m.

Venue : Room 4579 (Lift 27 & 28)

All are Welcome!