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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Efficient structure-preserving minimizing movement schemes for Wasserstein-like gradient flows

By

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Abstract

In this talk, I will present a novel numerical approach based on minimizing movement schemes for a class of Wasserstein-like gradient flows arising widely in applications in material sciences such as phase separation, crystal growth, solid-state wetting/dewetting, thin film surfactant dynamics and reaction-diffusion dynamics. By leveraging the variational structure, along with the dynamical characterization of the Wasserstein-like transport distance, we construct a fully discrete scheme that constitutes a series of minimization problems with convex objective function and linear constraint. We construct two different saddle-point formulations to address linear, concave and more general transport distances, and propose efficient primal dual operator splitting methods to solve the saddle-point problems. Our method has built-in positivity or bounds preserving, mass conservation, and entropy decreasing properties, and overcomes stability issue due to the strong nonlinearity and degeneracy. I will show a suite of simulation examples to demonstrate the effectiveness of our algorithm.

Date : 30 July 2025 (Wednesday)

Time : 4:30p.m.-5:30p.m.

Venue : Room 4504 (Lift 25/26)

All are Welcome!