THE UNIVERSITY OF HONG KONG

Department of Mathematics

Colloquium

Nonlocal Conservation Laws: Analysis, Computation, and Application in Traffic Flow Modeling

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Abstract

Nonlocal (hyperbolic) conservation laws appear in diverse applications such as traffic flow, supply chains, crowd dynamics, and fluid dynamics. In this talk, I will demonstrate how nonlocal integrals naturally arise in the flux functions of conservation laws, both from modeling and numerical perspectives. For instance, they can effectively model traffic flows of connected vehicles that perceive and respond to information over a wide spatial range. I will present a stability analysis showing asymptotic stability of equilibria under suitable nonlocal feedback, which aids the design of connected-vehicle control strategies. I will also establish a novel entropy condition that characterizes the local limit of these nonlocal models to classical conservation laws while supporting robust numerical computation. The developed analytical and computational framework provides effective tools for a broad class of nonlocal and classical conservation laws.

Date:	January 27, 2026 (Tuesday)
Time:	10:30 am – 12:00 noon
Venue:	Room 210, Run Run Shaw Bldg., HKU

All are welcome