THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

MINI COURSE

A selfdual variational calculus

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Abstract

How to solve partial differential systems by completing the square? Or how to solve nonlinear PDEs via convex analysis on phase space. The lectures will develop a method for associating suitable non-negative -often convex- energy functionals to a large class of partial differential equations and evolutionary systems. The minima of these functionals are to be the solutions we seek, not because they are critical points (i.e., from the corresponding Euler-Lagrange equations) but from being also zeroes of these functionals. This leads to variational formulations and resolutions of a large class of differential systems that cannot otherwise be Euler-Lagrange equations of action functionals. The "selfdual Lagrangians" we consider, were inspired by a variational approach proposed --over 40 years ago-- by Brezis and Ekeland for the heat equation and other gradient flows of convex energies. The approach is based on Fenchel-Legendre duality and is applicable in a wide range of problems.

Date:	November 7, 11 & 12, 2025
Time:	2:00 - 4:00pm
Venue:	Room 416, Run Run Shaw Bldg., HKU

All are welcome