THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Shape Derivatives in Scattering: A Differential Geometry Approach

Professor Jingzhi Li

Southern University of Science and Technology, China

Abstract

This talk presents the "derivative" of solutions of second-order PDE problems, in particular scattering ones, with respect to the shape of the domain. A rigorous approach relies on encoding shape variation by means of deformation scalar, vector or tensor fields, which will supply the directions for taking shape derivatives. These derivatives and methods to compute them numerically are key tools for studying shape sensitivity, performing gradient based shape optimization, and small-variation shape uncertainty quantification. A unifying view of second-order PDE problems recasts them in the language of differential geometry. Fittingly, the shape deformation through solution fields matches the concept of Lie derivative. This paves the way for a unified treatment of shape differentiation in the framework of differential geometry. Applications in scattering problems reveals the extraordinary power of the machinery.

Date:	Nov. 30, 2023 (Thursday)
Time:	10:00am – 11:00am
Venue:	ZOOM: https://hku.zoom.us/j/ Meeting ID: 913 6532 3891 Password: 310656

All are welcome