DEPARTMENT OF MATHEMATICS
THE CHINESE UNIVERSITY OF HONG KONG

MATH-IMS Joint Pure Mathematics Colloquium Series
The Chinese University of Hong Kong

This Colloquium Series in Pure Mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The series focuses on all areas of pure mathematics together with theoretical developments and applications.

Date: September 30, 2022 (Friday)
Time: 9:30-10:30AM (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/98846779826

Well-posedness for moving interfaces with surface tension in ideal compressible MHD

Speaker: Professor Yuri Trakhinin
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Abstract: We discuss recent results on the local well-posedness for an interface with surface tension that separates a perfectly conducting inviscid fluid from a vacuum. The fluid flow is governed by the equations of three-dimensional ideal compressible magnetohydrodynamics (MHD), while the vacuum magnetic and electric fields are supposed to satisfy the pre-Maxwell equations. The fluid and vacuum magnetic fields are tangential to the interface. This renders a nonlinear hyperbolic-elliptic coupled problem with a characteristic free boundary. We prove the local existence and uniqueness of solutions of this free boundary problem. Both the non-collinearity condition for the fluid and vacuum magnetic fields and the Rayleigh-Taylor sign condition required for the case of zero surface tension become unnecessary in our result, which verifies the stabilizing effect of surface tension on the evolution of moving vacuum interfaces in ideal compressible MHD. This is a joint work with Tao Wang.

Bio: Prof. Yuri Trakhinin is a principal scientist at the Sobolev Institute of Mathematics. Yuri is a leading expert in the PDEs modeling the motion of fluids with a free surface boundary, including non-relativistic and relativistic compressible Euler equations, MHD equations, and elastodynamics equations.