香港教育大學
The Education University of Hong Kong

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THE UNIVERSITY OF HONG KONG

Symposium on

Partial Differential Equations (PDE) 2022

June 25th, 2022 (Saturday) (Hong Kong Time)

This event will take place via ZOOM:

Webinar ID: 980 8279 8210 Passcode: 496119
ZOOM link: https://eduhk.zoom.us/j/98082798210

Organizing Committee

Dr SUEN Chun Kit Anthony (EdUHK) acksuen@eduhk.hk &

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HK Time	Speaker / Title
8:00 - 8:10 am	Opening
Session Chair: Anthony Suen	
8:10 - 9:05 am	**Vincent R. Martinez**, CUNY Hunter College and Graduate Center (USA) *On well-posedness at critical regularity for a family of active scalar equations arising in hydrodynamics*
9:05 - 10:00 am	**Cheng Yu**, University of Florida (USA) *Infinitely many solutions to the isentropic system of gas dynamics*
10:00 - 10:10 am	*Break*
Session Chair: Tak Kwong Wong	
10:10 - 11:05 am	**Hantaek Bae**, Ulsan National Institute of Science and Technology (South Korea) *Well-posedness of the two and half dimensional Hall MHD*
11:05 am - 12:00 noon	**Chunjing Xie**, Shanghai Jiao Tong University (China) *Liouville type theorems for steady Navier-Stokes system in a slab*

Organized by

Department of Mathematics and Information Technology, Faculty of Liberal Arts and Social Sciences, The Education University of Hong Kong (EdUHK) &
Department of Mathematics, Institute of Mathematical Research, The University of Hong Kong (HKU)
More details can be found at https://hkumath.hku.hk/~imr/event/PDE2022/index.php

Titles and Abstracts

Hantaek Bae, Ulsan National Institute of Science and Technology, South Korea

Title: *Well-posedness of the two and half dimensional Hall MHD*

Recently, the Hall MHD has been studied intensively over the past 10 years. But, not much attention was paid to its two and half dimensional version. In this talk, we first formulate the two and half dimensional Hall MHD by the approach used to explain the magnetic reconnection phenomena. We then provide several results, mostly to the two and half dimensional Hall equation (without the effect of fluid). If time allows, we introduce an extended model of the Hall MHD. This is a joint work with Kyungkeun Kang (Yonsei University).

Vincent R. Martinez, CUNY Hunter College and Graduate Center, USA

Title: *On well-posedness at critical regularity for a family of active scalar equations arising in hydrodynamics*

This talk discusses a family of active scalar transport equations characterized by increasingly singular constitutive laws. This family includes the 2D Euler and surface quasi-geostrophic (SQG) equations as members, and extrapolates beyond them. Although local well-posedness of the initial value problem in sufficiently regular settings are classical results for both the Euler and SQG equations, ill-posedness at critical regularity has only recently been established. For this talk, we consider various regularizations of this family in its most singular range that recover well-posedness results at the threshold regularity level, in spite of the apparently strong quasilinear structure of the equations in this regime. This is joint work with M.S. Jolly and A. Kumar.

Chunjing Xie, Shanghai Jiao Tong University, China

Title: *Liouville type theorems for steady Navier-Stokes system in a slab*

In this talk, we discuss some recent results on Liouville type theorems for steady Navier-Stokes system in a slab with either no-slip boundary conditions or periodic boundary conditions.In particular, we showed that bounded axisymmetric solutions in a slab must be zero or constant.The proofs are based on Saint-Vernant type estimate, which are quite elementary. This is a joint work with Jeaheang Bang, Changfeng Gui,and Yun Wang.

Cheng Yu, University of Florida, USA

Title: *Infinitely many solutions to the isentropic system of gas dynamics*

In this talk, I will discuss the non-uniqueness of global weak solutions to the isentropic system of gas dynamics. In particular, I will show that for any initial data belonging to a dense subset of the energy space, there exists infinitely many global weak solutions to the isentropic Euler equations for any $1 < \gamma \leq 1 + 2/n$. The proof is based on a generalization of convex integration techniques and weak vanishing viscosity limit of the Navier-Stokes equations. This talk is based on the joint work with M. Chen and A. Vasseur.