Singularity formation for 2D Boussinesq and 3D Euler equations with boundary and some related 1D models

Abstract:
In this talk, we will discuss recent results on stable self-similar singularity formation for the 2D Boussinesq and singularity formation for the 3D Euler equations in the presence of the boundary with $C^{1,\alpha}$ initial data for the velocity field that has finite energy. The blowup mechanism is based on the Hou-Luo scenario of a potential 3D Euler singularity. We will also discuss some 1D models for the 3D Euler equations that develop stable self-similar singularity in finite time. For these models, the regularity of the initial data can be improved to $C^{\infty,1}_{c}$. Some of the results are joint work with Thomas Hou and De Huang.