THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

COLLOQUIUM

The interplay between computation and analysis in the study of the Clay Millennium Problem on the Navier-Stokes equations

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Abstract

Whether the 3D incompressible Navier-Stokes equations can develop a finite time singularity from smooth initial data with finite energy is one of the Seven Millennium Problems posted by the Clay Mathematical Institute. We review some recent theoretical and computational studies of the 3D Euler equations which show that there is a subtle dynamic depletion of nonlinear vortex stretching due to local geometric regularity of vortex filaments. Our study shows that convection could have a stabilizing effect for certain flow geometry. This is demonstrated through two reduced models of the 3D incompressible Navier-Stokes equations. Finally we present convincing numerical evidence that the 3D Euler equations could develop a finite time singularity.

Date:	November 14, 2013 (Thursday)
Time:	4:00 – 5:00pm
Place:	Room 210, Run Run Shaw Bldg., HKU

All are welcome