On the Singularity formation of the 3D model for the incompressible Euler and Navier-Stokes equations

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Abstract:

In this talk, the singularity formation of a 3D model for the incompressible Euler and Navier-Stokes equations is studied. This 3D model is derived from the axisymmetric Navier-Stokes equations with swirl using a set of new variables. This model preserves almost all properties of the full 3D Euler or Navier-Stokes equations except for the convection term which is neglected. We will prove rigorously that the 3D model develops finite time singularities for a class of initial data with finite energy and appropriate boundary conditions, and it has the global regularity in time for another class of smooth initial data. Some results of generalized 1D and 3D models are also discussed.

References:
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