

Two-Dimensional Large Eddies: a Mathematical Challenge from Fluid Mechanics

OKAMOTO Hisashi

We study stability and bifurcation of stationary and time-periodic solutions of Kolmogorov's problem for the Navier-Stokes equations in 2D flat tori. Specifically we look for a unimodal solution, which is characterized by having a large, topologically simple pattern of streamlines. We present a conjecture that such simple patterns emerge in steady-states or time-periodic solutions at large Reynolds numbers, no matter what the external force may be. We confirm this conjecture by some numerical experiments. Thus the well-noted fact that a large structure appears in 2D large Reynolds number flows is reinforced in another form. (This is a joint work with Sun-Chul Kim of Chung-Ang University.)