INVISCID DAMPING AND ENHANCED DISSIPATION IN 2D FLUIDS

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We review some recent results on the asymptotic stability of stationary solutions to the two-dimensional Euler and Navier-Stokes equations of incompressible flows. In many cases, sharp decay rates for the linearized problem imply some sort of nonlinear asymptotic stability, both in the Euler equations (through the so-called inviscid damping) and the Navier-Stokes equations (undergoing enhanced dissipation). However, we will see that in the case of the 2D square periodic domain, the so-called Kolmogorov flow exhibits much more complex behavior: in particular, linear asymptotic stability holds, while nonlinear asymptotic stability is not true even for analytic perturbations.