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Equilibria and periodic orbits in 3D Navier-Stokes flow on a periodic domain

In this collaboration with Susumu Goto of Osaka University, we compute simple invariant solutions in incompressible Navier-Stokes flow in a periodic box. We use several different external body forces to input energy. Depending on the forcing, the transition from laminar to turbulent flow can be sub or super critical. While the invariant solutions are all approximate, I will focus in particular on equilibria and periodic orbits at relatively low Reynolds numbers, which may be amenable to rigorous computation and continuation.