Stationary Euler flows near the Kolmogorov flow

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Abstract

We exhibit a large family of new, non-trivial stationary states of analytic regularity, that are arbitrarily close to the Kolmogorov flow on the square torus. Our construction of these stationary states builds on a degeneracy in the global structure of the Kolmogorov flow. This has surprising consequences in the context of inviscid damping in 2D Euler and enhanced dissipation in Navier-Stokes.