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Kolmogorov-like Flow: Effect of the Boundaries on Stability and Transition to Weak Turbulence[1] RAVI KUMAR PALLANTLA, BALACHANDRA SURI, JEFFREY TITHOF, SCHATZ MICHAEL, ROMAN GRIGORIEV, Center for Nonlinear Science and School of Physics, Georgia Institute of Technology — The dynamical description of turbulence in fluid flows using non-chaotic unstable solutions of the Navier-Stokes equation, called Exact Coherent Structures (ECS), is a promising approach to understand and control the turbulence. However, it has never been properly validated in experiment. This talk discusses a quasi-two-dimensional implementation of the Kolmogorov flow that enables validation of both dynamical and statistical aspects of the ECS-based description of weak turbulence. We use a numerical model of an experiment, which employs an electromagnetically-driven thin layer of electrolyte supported by a thin layer of a liquid dielectric, to describe the effects of the boundary conditions and the system size on the stability of the base flow as well as the properties of ECS which emerge in the turbulent regime.

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