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Instabilities and mixing in a quasi-2D Lorentz-force driven flow

RADFORD MITCHELL, ROMAN GRIGORIEV, Center for Nonlinear Science and School of Physics, Georgia Institute of Technology — In this talk we describe the transition to weak turbulence in a Kolmogorov flow inside a thin layer of electrolyte driven by a steady current in experiment and a computational model. We find the mixing efficiency of the flow to be a non-monotonic function of the driving current, mirroring the temporal complexity of the flow pattern. We also illustrate the generic mechanism of mixing by time-periodic two-dimensional flows near a supercritical Hopf bifurcation and provide a perturbative description of the mixing process.

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