Abstract Submitted
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Study of staircase formation in Hasegawa-Wakatani turbulence, using a multi-field, $K-\epsilon$ based model[1] ARASH ASHOURVAN, Center for Energy Research (CER), UCSD, P.H. DIAMOND, CER, CASS & Department of Physics, UCSD, G. DIF-PRADALIER, CEA, IRFM, F-13108 St. Paul-lez-Durance cedex, France — Staircase formation is a generic form of secondary pattern formation instability in out-of-equilibrium, turbulent systems. Inhomogeneous mixing of potential vorticity across its background gradient can result in highly structured staircases in the PV profile, by weakening the background PV in some regions and sharpening it in others. We study the staircase formation in the density profile of a Hasegawa-Wakatani system, in which turbulence can be driven by both the density gradient and the flow shear. Total potential enstrophy of this system is explicitly conserved, up to the enstrophy production and dissipation terms. We use a 3-field model, which evolves the mean density profile, the mean vorticity profile, and the turbulent potential enstrophy. Both analytical and numerical techniques are used to study the equilibrium solutions and their stability, as well as the dynamics of this model.

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Arash Ashourvan
Center for Energy Research (CER), UCSD

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