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**Enstrophy-constrained stability analysis of beta-plane Kolmogorov flow with drag** YUE-KIN TSANG, WILLIAM YOUNG, Scripps Institution of Oceanography, UCSD — For forced two-dimensional flows, energy injected at a certain wavenumber is redistributed to both larger and smaller wavenumbers. This results in a constraint on the time evolution of the difference between the energy and enstrophy. By incorporating this constraint in an energy stability analysis of Kolmogorov flow on a beta-plane with drag, we establish an extended region in the parameter space of beta and the drag coefficient where the flow is stable to arbitrary perturbations. Complementary to this nonlinear stability result, linear instability theory is used to determine the part of the parameter space where the flow is unstable to infinitesimal perturbations. We also find that the most unstable mode in the linear stability analysis has a discontinuous change in structure as beta decreases below a certain value. Results from numerical simulations spanning the parameter space support the theoretical predictions.

Yue-Kin Tsang
Scripps Institution of Oceanography, UCSD

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