Abstract Submitted
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Using Synchronization to study the self-sustaining process in plane Couette flow turbulence[1] BRIAN FARRELL, Harvard University, PETROS IOANNOU, National and Kapodistrian University of Athens, DENNICE GAYME, VAUGHAN THOMAS, Johns Hopkins University — We show that separate realizations of turbulence in restricted nonlinear (RNL) simulations of plane Couette flow can be synchronized by linearly relaxing only the stream wise averaged components of the flow. The RNL system is obtained directly from the Navier-Stokes (NS) system by decomposing the dynamics into stream wise mean and perturbation equations and neglecting the perturbation-perturbation nonlinearity in the latter. Previous work demonstrated that the RNL system self-sustains turbulence with a mean flow as well as structural and dynamical features consistent with DNS. Using synchronization we verify that the self-sustaining process (SSP) operating in the RNL system is the parametric Lyapunov mechanism previously demonstrated to operate in the closely related stochastic structural stability theory (S3T) system.

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