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Global stability of plane Couette flow beyond the energy stability limit FEDERICO FUENTES, The University of Texas at Austin, DAVID GOLUSKIN, University of Victoria — This talk will present computations verifying that the laminar state of plane Couette flow is nonlinearly stable to all perturbations. The Reynolds numbers up to which this globally stability is verified are larger than those at which stability can be proven by the energy method, which is the typical method for demonstrating nonlinear stability of a fluid flow. This improvement is achieved by constructing Lyapunov functions that are more general than the energy. These functions are not restricted to being quadratic, and they are allowed to depend explicitly on the spectrum of the velocity field in the eigenbasis of the energy stability operator. The optimal choice of such a Lyapunov function is a convex optimization problem, and it can be constructed with computer assistance by solving a semidefinite program. This general method will be described in a companion talk by David Goluskin; the present talk focuses on its application to plane Couette flow.

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