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A homoclinic tangle at the edge of shear turbulence[1] LENNAERT VAN VEEN, University of Ontario Institute of Technology, GENTA KAWAHARA, Osaka University — Experiments, simulations and theoretical arguments lend mounting evidence for the "edge state" hypothesis on subcritical transition to shear turbulence. The hypothesis asserts that certain states of fluid motion, such as travelling waves and time-periodic flows, mediate between laminar and turbulent motion. Locally, the stable manifold of an edge state separates laminarizing from bursting flows. The global structure of the separatrix, however, is unknown. In this presentation, we show the existence of a flow homoclinic to a time-periodic edge state in plane Couette turbulence. Through classical theorems of dynamical systems theory, this implies a complex global geometry of the separating manifold. In particular, we can expect that any turbulent flow is close to the boundary, and small perturbations can cause it to relaminarize. Also, the homoclinic flow give a preferred route from near-laminar to turbulent flow and back. We study the physical characteristics of this cycle in detail.

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Lennaert van Veen
University of Ontario Institute of Technology

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