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Periodic orbits in plane Couette flow

Tobias Kreilos, Bruno Eckhardt

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We track the secondary bifurcations of coherent states in plane Couette flow and show that they undergo an incomplete periodic doubling cascade that ends with a crisis bifurcation. We introduce a symbolic dynamics for the orbits and show that the ones that exist fall into the universal sequence described by Metropolis, Stein and Stein for unimodal maps. The periodic orbits cover much of the turbulent dynamics in that their temporal evolution overlaps with turbulent motions when projected onto a plane spanned by energy production and dissipation.

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