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Statespace geometry of puff formation in pipe flow NAZMI BURAK BUDANUR, BJOERN HOF, IST Austria — Localized patches of chaotically moving fluid known as puffs play a central role in the transition to turbulence in pipe flow. Puffs coexist with the laminar flow and their large-scale dynamics sets the critical Reynolds number: When the rate of puff splitting exceeds that of decaying, turbulence in a long pipe becomes sustained in a statistical sense (Avila *et al.*, Science **333**, 192–196 (2011)). Since puffs appear despite the linear stability of the Hagen-Poiseuille flow, one expects them to emerge from the bifurcations of finite-amplitude solutions of Navier-Stokes equations. In numerical simulations of pipe flow, Avila *et al.*, Phys. Rev. Let. **110**, 224502 (2013) discovered a pair of streamwise localized relative periodic orbits, which are time-periodic solutions with spatial drifts. We combine symmetry reduction and Poincaré section methods to compute the unstable manifolds of these orbits, revealing statespace structures associated with different stages of puff formation.

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