Geophysical Research Abstracts,
Vol. 11, EGU2009-249, 2009
EGU General Assembly 2009


# An explanation of bursting in shear flows in terms of periodic orbits and unstable manifolds

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Since the publication of a landmark paper by Kawahara and Kida on the relevance of unstable periodic solutions to shear flow in 2001, the scale of dynamical systems-type computations in turbulence research has increased spectacularly. Equilibrium and periodic solutions have been computed in great spatial detail for Couette flow, pipe flow and many other geometries. One of the main goals of these computations is to explain the process of turbulent bursting in shear flows. Often, this transition occurs in the presence of a asymptotically stable laminar flow, so ordinary bifurcation scenarios cannot explain them. Instead, the current focus is on so-called "edge states", i.e. saddle-type equilibria or periodic solutions that appear to live on a boundary between turbulent and laminar behaviour in phase space. In principle, we should be able to clarify the bursting process if we know the geometry of the (un)stable manifolds of such states. However, the systematic computation of these manifolds is a hard task. I will present a recently developed algorithm for the computation of unstable manifolds and its application to shear flow, both in a toy model and in a full-scale simulation of turbulent Couette flow.