Nonlinear Sciences > Chaotic Dynamics

A mechanism for switching near a heteroclinic network

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We describe an example of a structurally stable heteroclinic network for which nearby orbits exhibit irregular but sustained switching between the various sub-cycles in the network. The mechanism for switching is the presence of spiralling due to complex eigenvalues in the flow linearised about one of the equilibria common to all cycles in the network. We construct and use return maps to investigate the asymptotic stability of the network, and show that switching is ubiquitous near the network. Some of the unstable manifolds involved in the network are two-dimensional; we develop a technique to account for all trajectories on those manifolds. A simple numerical example illustrates the rich dynamics that can result from the interplay between the various cycles in the network.

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