

# Explicit calculations of homoclinic tangles surrounding magnetic islands in tokamaks

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## Abstract

We present explicit calculations of the complicated geometric objects known as homoclinic tangles that surround magnetic islands in the Poincaré mapping of a tokamak's magnetic field. These tangles are shown to exist generically in the magnetic field of all toroidal confinement systems. The geometry of these tangles provides an explanation for the stochasticity known to occur near the X-points of the Poincaré mapping. Furthermore, the intersection of homoclinic tangles from different resonances provides an explicit mechanism for the non-diffusive transport of magnetic field lines between these resonance layers.

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