
Shearless Invariants in Non twist Symplectic Maps

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Abstract

Nontwist Hamiltonian systems have shearless invariant curves that act like transport barriers in phase space [1, 2]. We use Slater's theorem to develop a qualitative and quantitative numerical approach to determine the breakup of these shearless invariant curves in the phase space of area-preserving maps [3]. We also determine the breakup critical parameters, of the shearless curves, with a procedure based on the determinism analysis performed on the recurrence plot of orbits near the critical transition [4]. As numerical examples we present the onset of such transport barriers in tokamaks and their dependence on the control parameters, namely, the fluctuating electric field and the equilibrium electric field shear [5].

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