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Self-consistent chaotic transport in a mean-field Hamiltonian map model

Abstract:

Self-consistent chaotic transport is studied in a mean-field Hamiltonian map model obtained from successive reductions of dynamical equations of a continuous system. The model provides a simplified description of transport in marginally stable systems including vorticity mixing in strong shear flows and electron dynamics in plasmas. The particular form and structure of the map model allow it to be studied with different set of tools normally used in KAM theory related problems. The findings in periodic orbits and existence of coherent structures derived in the definition of a simpler map model to study with detail a physically interesting asymptotic state of the model. A main part of the study focus on determining a priori values of the parameters and initial conditions for the onset of global transport related to the existence and destruction of topological barriers.