

Near-integrable behavior in a system with discrete phase space

Heather Reeve-Black and Franco Vivaldi, Queen Mary, University of London

We consider a model of planar rotations subject to round-off, which leads to dynamics on a lattice. We let the angle of rotation approach a low-order rational. The resulting dynamics is a discrete-space version of the strip maps found in outer billiards of polygons. There is a non-smooth integrable Hamiltonian system, featuring a foliation by polygonal invariant curves, which represents the limit of vanishing discretisation. We prove that, for sufficiently small discretisation, a positive but vanishing fraction of those invariant curves survives. We explore some aspects of the asymptotic dynamics, both analytically and numerically.