

Title: Near quasi-integrable Hamiltonian impact systems

Abstract:

Near-integrability is usually associated with smooth small perturbations of smooth integrable Hamiltonian systems or smooth deformations of billiards in confocal quadrics. Combinations of integrable Hamiltonian flows with impacts that respect the symmetries of the integrable structure, globally or respectively, locally, provide additional classes of non-smooth integrable or, respectively, quasi-integrable systems [1, 2, 3]. A piecewise smooth return map that describes the dynamics near a tangent torus of the non-smooth integrable systems under small perturbations is derived and studied [4]. For the quasi-integrable case, we show that there are connected energy surfaces that include genus 2 level-sets as well as level sets of genus higher than 2. The return maps for such systems are families of interval exchange maps that are piecewise symplectic. For some cases it is possible to prove that the interval exchange maps are ergodic for a full measure set of actions [5]. Perturbations of such systems lead to iso-energy return maps that are near-quasi-integrable piecewise smooth symplectic maps with fascinating dynamics (in progress).

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