Rotation vectors for torus maps using the weighted Birkhoff average

Evelyn Sander

Abstract
In this talk, I will discuss numerical methods for studying one- and two-dimensional invariant tori based on the weighted Birkhoff average. These methods do not rely on symmetries, such as time-reversal symmetry, nor on approximating tori by periodic orbits. These methods are combined with computational number theoretic methods for calculating whether a number (resp. vector) is rational (resp. nonresonant) up to a certain tolerance. Together, these methods make it possible to distinguish between chaotic regions, islands, and invariant tori, while simultaneously giving a highly accurate estimate of the frequency vector of each torus. We demonstrate these methods for Arnold's circle map, Chirikov's standard map and some of its variants, and to the three-dimensional standard volume-preserving map.

This work is in collaboration with James Meiss.