Title:

Shadowing of non-transversal heteroclinic chains in lattices

Abstract:

We deal with dynamical systems on complex lattices possessing chains of non-transversal heteroclinic connections between several periodic orbits. The systems we consider are inspired by the so-called toy model systems (TMS) used to prove the existence of energy transfer from low to high frequencies in the nonlinear cubic Schrödinger equation (NLS) or generalizations. Using the geometric properties of the complex projective space as a base space, we generate in a natural way collections of such systems containing this type of chains, both in the Hamiltonian and in the non-Hamiltonian setting. On the other hand, we characterize the property of block diagonal dynamics along the heteroclinic connections that allows these chains to be shadowed, a property which in general only holds for transversal heteroclinic connections. Due to the lack of transversality, only finite chains are shadowed, since there is a dropping dimensions mechanism in the evolution of any disk close to them. The main technical shadowing tool used in our work is the notion of covering relations as introduced by one of the authors.

This is a joint work with Piotr Zgliczynski, Jagiellonian University, Krakow.