* Electronic Address: ivan.i.ovsyannikov@gmail.com
[1] University of Bremen

Global bifurcations and discrete Lorenz attractors

Ivan Ovsyannikov[1]*

A presence of non-transversal homoclinic or heteroclinic orbits (tangencies) in a dynamical system is regarded as a universal criterion of existence of a complex dynamics. However, it does not immediately lead to the emergence of genuine strange attractors (i.e. those preserving their "strangeness" under small perturbations) such as the Lorenz attractors. In the talk the list of three-dimensional diffeomorphisms with quadratic homoclinic and heteroclinic tangencies is presented in which discrete Lorenz attractors are born in bifurcations. For some of them a stronger result was also proved: in any neighbourhood there exist residual sets in which systems possess a countable number of coexisting discrete Lorenz attractors. Note that the bifurcations under consideration can be of codimension three, two and even one. In order to get Lorenz attractors one needs to have the effective dimension of the problem to be not less than three. For 3D diffeomorphisms this means that there should be no global contraction/expansion and no global center manifolds. To fulfill the first condition the Jacobian at the saddle fixed point should be close to 1 in the homoclinic case, and in the heteroclinic case it is enough to have the so-called contracting-expanding configuration, when the Jacobian at one saddle is less than one and greater than one at another saddle. The following conditions prevent the appearance of center manifolds: 1. At least one of the saddle fixed point is a saddle-focus; 2. All the fixed points are saddles but one of the homoclinic/heteroclinic orbits is non-simple; 3. A saddle is resonant (two stable eigenvalues either coincide or have opposite signs).