Birth of discrete Lorenz attractors in global bifurcations

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Discrete Lorenz attractors are chaotic attractors, which are the discrete-time analogues of the well-known continuous-time Lorenz attractors. They are genuine strange attractors, i.e. they do not contain simpler regular attractors such as stable equilibria, periodic orbits etc. In addition, this property is preserved under small perturbations. Thus, Lorenz attractors, discrete and continuous, represent the so-called robust chaos.

In the talk a list of global (homoclinic and heteroclinic) bifurcations (see [1, 2] and others) is presented, in which it was possible to prove the appearance of discrete Lorenz attractors. The proof is based on the study of first return (Poincare) maps [3, 4], which have a form of a three-dimensional Henon-like map.

References

[1] S. Gonchenko, I. Ovsyannikov, On global bifurcations of three-dimensional diffeomorphisms leading to Lorenz-like attractors, *Math. Model. Nat. Phenom.* **8** (2013), pp. 71–83.

[2] S. Gonchenko, I. Ovsyannikov, J. Tatjer, Birth of discrete Lorenz attractors at the bifurcations of 3D maps with homoclinic tangencies to saddle points, *Regul. Chaotic Dyn.* **19** (2014), pp. 495–505.

[3] S. Gonchenko, A. Gonchenko, I. Ovsyannikov, D. Turaev, Examples of Lorenz-like attractors in Hénon-like maps, *Math. Model. Nat. Phenom.* **8** (2013), pp. 32–54.

[4] I. Ovsyannikov, D. Turaev, Analytic proof of the existence of the Lorenz attractor in the extended Lorenz model, *Nonlinearity* **30** (2017), pp. 115–137.