On cascades of elliptic periodic points in area-preserving maps with homoclinic tangencies

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We use qualitative and topological methods to study the orbit behaviour near nontransversal homoclinic orbits in area-preserving maps which are not necessarily orientable. Let f_0 be such C^r-smooth map ($r \geq 3$) having a saddle fixed point O whose stable and unstable invariant manifolds have a quadratic tangency at the points of some homoclinic orbit Γ_0. Let f_ε be a family (unfolding) of area-preserving maps containing the map f_0 at $\varepsilon = 0$.

Our aim is to study bifurcations of the so-called single-round periodic points in the family f_ε. Every point of such an orbit can be considered as a fixed point of the corresponding *first return map*. We study bifurcations of the fixed points and prove the existence of cascades of generic elliptic periodic points for one and two parameter unfoldings f_ε. Thus, we generalize the results obtained in [1] where only the symplectic (area-preserving and orientable) case was analyzed.

References

[1] M. Gonchenko, S. Gonchenko, *On cascades of elliptic periodic points in two-dimensional symplectic maps with homoclinic tangencies*, Regular and Chaotic Dynamics **14(1)**, 2009. 116-136.