On the structure of 1:4 resonances in conservative Hénon-like maps.

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Abstract

I will overview my results from [1] related to bifurcations of fixed points with multipliers $e^{\pm i\pi/2}$ (the so-called 1:4 resonances) for the following conservative Hénon-like maps:

1) the conservative generalized Hénon maps

$$\bar{x} = y, \quad \bar{y} = M_1 - x - y^2 + Sy^3;$$

2) the conservative cubic Hénon maps

$$\bar{x} = y, \quad \bar{y} = M_1 - x + M_2y \pm y^3.$$

Here (x, y) are coordinates in $\mathbb{R}^2$, M_1 and M_2 are parameters, S is a small coefficient.

In case 1), the bifurcations are nondegenerate if $S \neq 0$ and they are essentially different depending on the sign of S. A two-parameter analysis of the bifurcations at the critical moment $S = 0$ is given.

In case 2), the structure of the $1 : 4$ conservative resonances is nondegenerate always for the cubic map with "+", whereas, in the cubic map with "−" a degenerate situation is observed at $M_1 = \pm 16/27, M_2 = 1/3$ (at this moment $A = -i$, where A is the coefficient in the corresponding standard complex normal form).

References

[1] M.S. Gonchenko. On the structure of 1:4 resonances in Henon maps. *Int.J. "Bifurcation and Chaos"*, 15(11):3653-3660, 2005.