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On the Hamiltonian Hopf bifurcation in the 3D Hénon-Heiles Hamiltonian revised

In 2002 it was conjectured that the Hamiltonian system of the 3D Hénon-Heiles Hamiltonian

$$H(p,q) = \frac{1}{2}\left(p_1^2 + p_2^2 + p_3^2\right) + \frac{1}{2}\left(q_1^2 + q_2^2 + q_3^2\right) + a\left(\lambda q_3\left(q_1^2 + q_2^2\right) + \frac{q_3^3}{3}\right)$$

can exhibit a Hamiltonian Hopf bifurcation for the λ values of $1/2$ and $5/2$. This conjecture was proved almost immediately for the values of $\lambda = 1/2$ and also for λ near $5/2$ and -1, when the parameters a is sufficient small. In this work we show that this Hamiltonian system exhibits a Hamiltonian Hopf bifurcation for the values of $\lambda \in (-\infty, -1] \cup [1/2, 1] \cup [5/2, \infty)$ and for all value of parameter a. Moreover we provide analytical approximation of the three periodic orbits bifurcating from the Hamiltonian Hopf equilibrium at the origin of the Hamiltonian system for these values of the parameters λ and a.

Joint work with Jaume Llibre (Universitat Autònoma de Barcelona).

Referencias

[1] S. Ferrer, H. Hanβmann, J. Palacián, P. Yanguas, *On perturbed oscillators in* $1-1-1$ *resonance: the case of axially symmetric cubic potentials*, J. Geom. Phys **40** (2002), 320–369.

[2] H. Hanβmann, JC. Van der Meer, *On the Hamiltonian Hopf Bifurcations in the 3D Hénon-Heiles Family*, J. Dynamics and Differential Equations **14** (2002), 675–695.

[3] M. Hénon, C. Heiles, C. *The applicability of the third integral of motion: Some numerical experiments*, Astron. J. **69** (1964), 73–79.