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Numerical and experimental investigations of dynamics of magnetic pendulum with an aerostaticic bearing

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Abstract: In this paper, both numerical and experimental results of dynamics of magnetic pendulum with an aerostatic bearing are presented. The experimental stand consists of pendulum, which has neodymium magnet at its end. The pivot of the pendulum is supported on aerostatic bearing therefore, resistance to motion is negligible and it is of viscous character. An electric coil was placed eccentrically under the pendulum. Electric current in the coil is of a square waveform with a given frequency and duty cycle. In the paper mathematical and physical models with experimentally confirmed system parameters are shown. The magnetic interaction is presented as a moment of force in function of the electric current and position of the pendulum. The results of the simulation and experiment showed a rich dynamics of the system, including various types of regular motion (multi-periodicity) and chaos.

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