

Rotational evolution of planetary systems under the action of gravitational and magnetic perturbations

Kitiashvili I., Gusev A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Dynamics of planets around other stars that demonstrate a variety of possible characteristics is of interest from the point of view of realization of new scenarios of evolution which have not been realized in the Solar System. We consider the rotational evolution of exoplanets under the action of gravitational perturbations and magnetic disturbances using the methods of quality analysis and theory of bifurcation of multiparametric differential equations that describe evolution of non-resonant rotation of a dynamically symmetric planet magnetized along its symmetry axis. We analyze 64 phase portraits describing the evolution of angular momentum vector L for all possible values of planet parameters. The values of parameters are determined for the case when the direct rotation of a planet is changed for its retrograde rotation. © 2010 Pleiades Publishing, Ltd.

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