

“Exotic” states of the synchronous rotation of non-spherical planetary satellites

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Some theoretically possible “unusual” regimes of the rotational motion of non-spherical planetary satellites in the synchronous spin-orbit resonance are studied. These regimes concern (1) period-doubling bifurcations of the center of the synchronous spin-orbit state (due to parametric resonance); (2) various kinds of the synchronous resonance itself, i. e. various kinds of corresponding stable periodic solutions (so-called α - and β -resonances). The scales of corresponding observable dynamical phenomena with respect to the values of the eccentricity and the parameter of dynamical asymmetry are analyzed. A conclusion is made that the period-doubling bifurcation regime may be present in the rotation of Phobos, Deimos, Epimetheus, Helene and Pandora. Preferences in the occurrences of α - and β -resonances are discussed.