Fifteenth International Conference Zaragoza-Pau on Mathematics and its Applications
Jaca, September 10–12th 2018

The Triaxiality Role in the Spin-Orbit Dynamics of a Rigid Body.

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SUMMARY

We study the roto-orbital dynamics of a uniform sphere and a triaxial body by means of a radial intermediary, which defines a 2-DOF Hamiltonian system. Our analysis is carried out by using variables referred to the total angular momentum. Its validity and applicability is assessed numerically by experiments comprising three different scenarios; analysis of the triaxiality, eccentricity and altitude. They show that there is a range of parameters and initial conditions for which the radial distance and the slow angles are estimated accurately, even after one orbital period. On the contrary, fast angles deteriorates as the triaxiality grows. We also include the study of the relative equilibria, finding constant radius solutions filling 4-D and lower dimensional tori. These families of relative equilibria include some of the classical ones reported in the literature and some new types. For a number of scenarios the relation between the triaxiality and the inclination connected with relative equilibria are given.

Keywords: Rotational and orbital dynamics, gravity-gradient, intermediary, relative equilibria

AMS Classification: 70F05, 70F15.

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