About applications angle-action variables in rotation dynamics of the deformable celestial bodies

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Abstract

For the investigation of the rotational motion of deformable (elastic) celestial bodies the special forms of the equations in angle–action variables are suggested: these angle–action variables are introduced on the basis of the integrable problem about the rotation of some isolated elastic body deformed by its own rotation. For this purpose we use canonical equations in elastic Andoyer variables which were introduced by Getino and Ferrándiz (1995) in the problem of the rotation of the deformable Earth.

In a particular case (very important for the investigation of the rotational motion of the Earth and others bodies) the unperturbed integrable problem is reduced to Euler integrable case but with no–constant moments of inertia. As result we get new forms of the equations for the rotational motion of the deformable body and wide list formulae for construction of an analytical theory of the rotational motion of the celestial body deformed by tidal attraction of external bodies and by its own rotation. We use this theory for the construction of a new analytical theory of the perturbed rotational motion of the elastic Earth.

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References

[1] Getino, J. and Ferrándiz, J.M.: 1995, *Celes. Mech.*, **61**, 117–180