Viscoelastic Tides: Models for Use in Celestial Mechanics

Clodoaldo Ragazzo [1]

[1] IME-USP

In this talk I will present equations for the motion of linear viscoelastic bodies interacting under gravity. The equations are fully three dimensional and allow for the integration of the spin, the orbit, and the deformation of each body. The equations are obtained within a finite dimension Lagrangian framework with dissipation function. The main contribution is a procedure to associate to each spring-dashpot model, which defines the rheology of a body, a potential and a dissipation function for the body deformation variables. The theory is applied to the Earth (solid part plus oceans) and a comparison between model and observation of the following quantities is made: norm of the Love numbers, rate of tidal energy dissipation, Chandler period, and Earth-Moon distance increase.