ABSTRACT ONLY

TIDAL EVOLUTION IN DWARF PLANETS SYSTEMS AS AN APPLICATION OF THE CREEP MODEL

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To date, there are five confirmed dwarf planets, four of which are located in the trans-Neptunian region, namely: Pluto, Eris, Haumea, and Makemake. All four have natural satellites. It is well known that Pluto-Charon's rotations are synchronized with the orbital motions. Eris and Dysnomia also have their rotational and orbital periods synchronized, respectively. This synchronous state is a natural consequence of tidal interaction between the dwarf planet and its main satellite. In this work, we propose to investigate the orbital evolution of the tides in Pluto-Charon and Eris-Dysnomia systems using the creep model, where the main parameter is the viscosity attributed to the deformed body. Regarding the action of the tides on both bodies, we integrated the equations for the mean variations of semi-major axis, eccentricity, and rotation velocity over Gyr timescales, to investigate when and how the system could have entered into synchronous motion. In addition, based on the equations of the creep model, we performed a parameter space analysis to obtain the most influential parameter on the orbital evolution of dwarf planets and their satellites.

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