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Oceanic tides : a hierarchy of models

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Oceanic tides play a fundamental role in the evolutionary dynamics of some orbital systems, influencing energy dissipation significantly. Their detailed understanding and precise quantification provide answers ranging from the fate of an orbit to the history of a planet. Achieving this understanding entails a stepwise incorporation of physical parameters, while accurate quantification demands reaching a level of realism commensurate with the intricacies of oceanic dynamics. Starting from validating the results of the analytical models, a numerical method allows then the introduction of a realistic bathymetry and continentality and the possibility to add non-linear terms. This presentation showcases results obtained from a numerical approach using finite elements for various oceanic tides models of increasing complexity and the work in progress to take into account a non-linear drag effect.

Astrophysics Field

Oceanic tides, Earth-Moon system, Orbital evolution

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