A revised value of the Earth dynamical ellipticity HIAU2006

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Abstract

We recompute the Earth dynamical ellipticity H from the value given in Capitaine et al. (2003) that gave rise to IAU 2006 precession. The methodology is similar to the followed in that work, also to that of Williams (1994) and Souchay & Kinoshita (1996), and consists of obtaining H from the first-order lunisolar precession, once accounted the main higher order precession contributions.
In particular, by means of a Hamiltonian approach we complete the precession parts due to the second order terms, in the perturbation theory sense, and to the redistribution of mass of tidal origin. The first ones (Baenas et al. 2017) incorporate the effects of the Earth non-rigidity, absent in HIAU2006. The second ones present a comprehensive and complete development of the effects of the redistribution (Baenas et al. 2019) computed with the Love sets from IERS Conventions (2010, chapter 6) and Williams & Boggs' (2016) direct oceanic tides.

Besides, our treatment allows specifying unambiguously the tidal system in which H is given, recommending its zero-frequency value (Escapa et al. 2022). That fact is indispensable for achieving consistency among the different constants used in Astrodynamics, Astronomy, Geodesy, etc., and collected in the numerical standards like, for example, in IERS Conventions (2010, chapter 1).

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