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Harmonic development of disturbing functions in theories of the Earth and Moon rotation

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Abstract

New development of the disturbing functions in Kinoshita's theory of the Earth rotation [1] to accurate analytical series is done. The main differences of our series from the Kinoshita's ones are as follows:

- The new expansions are done in the ICRF;
- The latest long-term numerical ephemerides of the Moon and planets DE/LE-406 are used as the source of disturbing bodies coordinates.
- The new expansions are second-order Poisson series while the Kinoshita's expansions are first-order Poisson series;
- The number of the expansion series' terms is increased by an order of magnitude.

The new expansions are valid over 2,000 years, 1000AD–3000AD, have a form similar to that of Kinoshita's series, and can be used in developing modern theories of the Earth and Moon rotation, as well as in studies of lunar librations, like [2].

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References

[1] Kinoshita, H. (1977) *Cel. Mech.*, 15, 277–326.

[2] Barkin, Yu., Gusev, A., Petrova, N. (2006) *Adv. Space Res.*, 37, 72–79.