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About solution of general Liouville problem of the Earth and planets rotation.

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Abstract

Celestial bodies rotation are usually studied with linear equations which are derived by strong simplification of kinetic moment conservation equation. This force to confine itself by normal mode expansion . But long term and intensive observations of Earth Orientation Parameters (EOP), for example had revealed that wobble , axial spin rotation and some other modes are much more complex phenomena than follows from linear theory and thus requires more general approach.

Here is presented solution of original kinetic moment equations – Liouville's system ,preliminary transformed into the form yielding accurate within microseconds of arc numerical integration. For the first time is proved that free wobble and spin rotation are performed in synchronous way forming spatial saddle trajectory . An excitation of wobble and spin modes is explored on the model of 3-axis rigid body with surface mass transfer. Unlike linear solution this one has non-harmonic signal as in pole motion and axial rotation.