THE PROBABILISTIC APPROACH TO THE DESCRIPTION OF THE CHANDLER WOBBLE

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INTRODUCTION

The probabilistic approach to the description of the Chandler wobble (CW) was proposed by Arato, Kolmogorov and Sinai in [Arato et al., 1962]. They assumed that the moment of the forces causing the CW is a stationary random process with correlation time \( t_{r} \), which is small in comparison with length of the row of observations. Then, the CW itself can be regarded as a diffusion Markovian process with discrete time, wherein the sampling step \( s_{i} \) must satisfy the condition \( t_{r} \gg s_{i} \).

There was shown in [Tsurkis et al., 2009], that the probabilistic model does not contradict with observations. Besides, evaluations for \( t_{r} \), and the diffusion coefficient \( D \) were obtained:

\[ t_{r} \approx 100 \text{ days}, \quad D \approx 1.1 \times 10^{-8} \text{ rad}^{2} \text{ day}^{-1}. \]

An equally important task is the studying of processes causing CW. Polar motion is due to several reasons, the main of which, apparently, is the impact of ocean and atmosphere to the solid Earth [Gross et al., 2003; Barnes et al., 1993]. The article [Tsurkis et al., 2012b] is devoted to analysis of the data on ocean angular momentum. This report is based on the results obtained there.

In the interval 0...50 days, if \( |t| \ll \Delta t \) then a close to true,

\[ F_{w} = 0.10 \times 10^{-8} \text{ rad}^{2} / \text{day}. \]

The coefficient of diffusion \( D \) and the anisotropy constant \( \kappa \) can reliably estimate, using \( (10), (11) \) and formulas (5) and (6).

\[ a_{1} = 1.3 \times 10^{-2}, \quad a_{2} = 2.2 \times 10^{-7} \text{ rad}^{2} / \text{day}^{2}, \quad a_{3} = 0.066, \quad a_{4} = 0.074. \]

References


