TRIAXIAL EARTH'S ROTATION: CHANDLER WOBBLE, FREE CORE NUTATION AND DIURNAL POLAR MOTION

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In this study, we formulate two-layered triaxial Earth rotation theory, focusing on the influence of the triaxiality on the Chandler wobble (CW), free core nutation (FCN) and diurnal polar motion. We estimate the frequencies of the normal modes CW and FCN, and results show that though the influence of two-layer triaxiality on the CW and FCN frequencies are very small, there appear some new natures. The response of the Earth's polar motion to the excitation consists of two parts. One is in response to the same frequency excitation and the other is in response to the opposite frequency excitation. For an Earth model with triaxial mantle and core, both of these two parts have four resonant frequencies rather than two that are suggested by rotational symmetric Earth model. However, due to the small strength of these new resonances, the effects of these resonances are only significant when the excitation frequencies are very near to these resonance frequencies. In addition, compared to the biaxial case, the influences of the triaxiality on the prograde and retrograde diurnal polar motions excited by ocean tide component K_1 are estimated as -1.4μas and -0.9μas respectively, which should be taken into account in theory. This study is supported by National 973 Project China (grant No. 2013CB733305), NSFC (grant Nos. 41174011, 41210006, 41128003, 41021061).