

On the Main Factor That Causes the Instabilities of the Earth Rotation

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Abstract : Earth rotation is one of astronomical phenomena without which it is impossible to think of human life. That is why the investigation of the Earth's rotation is very important, and it has a long history of study. The invention of quartz clocks in the 1930s and atomic time 1950s and the introduction of modern technology into astronomic observation in recent years resulted in rapid development of the study of Earth's rotation. The theory of the Earth rotation, however, has not been up to the high level of astronomic observation due to limitation of the time such as impossibility of quantitative calculation of moment of external force for Euler's dynamical equation based on Newtonian mechanics. As a typical example, we can take the problems that cover the instabilities of the Earth's rotation proved completely by the astronomic observations as well as polar motion, the precession and nutation of the Earth rotation axis which have not been described in a single equation in a quantitative way from the unique law of Earth rotation. In particular, at present the problem of what the main factor causing the instabilities of the Earth rotation is has not been solved clearly in quantitative ways yet. Therefore, this paper addresses quantitative proof that the main factor which causes the instabilities of the Earth rotation is the moment of external force rather than variations in the relative atmospheric angular momentum and in moment of inertia of the Earth's body due to the time limitation and under some assumptions.

Keywords : atmospheric angular momentum, instabilities of the Earth's rotation, law of the Earth's rotation change, moment of inertia of the Earth

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