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Improved measurement of short-periodic polar motion by the Wettzell G ring laser

T. Klügel (1), U. Schreiber (2), A. Velikoseltsev (2) and W. Schlüter (1)

(1) Bundesamt für Kartographie und Geodäsie, Geodetic Observatory Wettzell (kluegel@fs.wettzell.de), (2) Technical University Munich, Geodetic Observatory Wettzell (schreiber@fs.wettzell.de)

Extremely precise inertial rotation sensors being attached to the Earth allow the measurement of the absolute rotation rate of the Earth and the orientation of the instantaneous rotation axis in an Earth fixed frame with high temporal resolution. The world's most precise inertial rotation sensor, the G ring laser at the Geodetic Observatory Wettzell operating since 2001, has undergone a technical upgrade in 2006. The former resolution of 10^{-8} with respect to the Earth rotation rate could be further improved giving more insight to signals affecting inertial Earth rotation measurements. This implies a better determination of the retrograde diurnal polar motion terms, also known as Oppolzer terms, that cannot be directly be measured by the geodetic space techniques. The recent detection limit for periodic signals in the diurnal to semi-diurnal frequency band is 0.2 milliseconds for length-of-day variations or 0.5 milliarcseconds (2.5 nanorad) for polar motion.