Geometric interpretation of the Earth rotation vector from the non-linearized skew-symmetric tensor

P.J. Mendes Cerveira (1), R. Weber (1) and H. Schuh (1)

(1) Advanced Geodesy, Institute of Geodesy and Geophysics, Vienna University of Technology, Austria

The rotation matrix D, which accounts for polar motion and the hour angle of the true equinox of date, transforms vectors from a terrestrial (TRS) to an intermediate reference system (IRS). The skew-symmetric tensor (D transposed times time-derivative of D) allows recovering the "instantaneous Earth rotation vector", w.r.t. the TRS. In deriving the "instantaneous Earth rotation vector", as it appears in recent literature (e.g. Gross 1992, Brzezinski and Capitaine 1993), it is assumed that the precession/nutation model is perfectly known. The traditional way for obtaining the "Earth rotation vector" keeps only terms to first order in small quantities (i.e. polar motion and departure from uniform spin at the mean sidereal rotation rate of the Earth). In the presentation, we consider the non-linearized skew-symmetric tensor and give a complete geometrical interpretation of the motion of the "Earth rotation vector" w.r.t. the normalized vector of the so-called celestial intermediate pole (CIP), which stands here for the pole of the theoretical IRS.