

Estimation of Earth Rotation Parameters for Enhancing the Precise Realization of ITRF

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ABSTRACT:

Earth rotation along with gravity field and geo-kinematics define the terrestrial reference frame. The International Terrestrial Reference Frame (ITRF) which is considered to be the ideal realization of Earth Centred Earth Fixed Cartesian Coordinate System is realized by various inputs such as station positions and velocities, time series of station positions and earth orientation parameters (EOP). EOP are the parameters which provide the rotation of the International Terrestrial Reference System (ITRS) to the International Celestial Reference System (ICRS), or vice versa, as a function of time. The computation of EOP includes computation of Earth Rotation Parameters (ERP) i.e. x_p , y_p and (UT1-UTC). There are various methods for determination of earth rotation parameters (ERP)-gravitational (e.g. super conducting gravimeters), geometric (e.g. Very Long Baseline Interferometry (VLBI)) and dynamical (e.g. satellite Doppler tracking, Satellite Laser Ranging (SLR), Lunar Laser Ranging (LLR) and Global Navigation Satellite System (GNSS)). ITRF is realized by four space geodetic measures: SLR, VLBI, GNSS and DORIS, while ICRF is realized by VLBI only. Since in India we have GNSS only, therefore, we will be contributing using this technique for realization of ITRF and ICRF. Albeit only two IGS (International GNSS Service) sites exist in southern India, rendering a big gap of IGS stations in south east Asia. IIT Kanpur is establishing an IGS station in its campus and observations from this site present in North Indian subcontinent will contribute to the precise determination of pole to which ERP is referred to. The definition of the terrestrial reference system is governed by how accurately we are able to define the coordinates of earth rotation axis or pole. Increasing the precision of ERP computation, we can realize the ITRF with more precision.

KEY WORDS: ITRF, EOP, ERP, GNSS, VLBI.