

IAU 2006 Resolution 1

English version

Adoption of the P03 Precession Theory and Definition of the Ecliptic

The XXVIth International Astronomical Union General Assembly,

Noting

1. the need for a precession theory consistent with dynamical theory,
2. that, while the precession portion of the IAU 2000A precession-nutation model, recommended for use beginning on 1 January 2003 by resolution B1.6 of the XXIVth IAU General Assembly, is based on improved precession rates with respect to the IAU 1976 precession, it is not consistent with dynamical theory, and
3. that resolution B1.6 of the XXIVth General Assembly also encourages the development of new expressions for precession consistent with the IAU 2000A precession-nutation model, and

Recognizing

1. that the gravitational attraction of the planets make a significant contribution to the motion of the Earth's equator, making the terms *lunisolar precession* and *planetary precession* misleading,
2. the need for a definition of the ecliptic for both astronomical and civil purposes, and
3. that in the past, the ecliptic has been defined both with respect to an observer situated in inertial space (inertial definition) and an observer comoving with the ecliptic (rotating definition),

Accepts

the conclusions of the IAU Division I Working Group on Precession and the Ecliptic published in Hilton *et al.* (2006, *Celest. Mech.* **94**, 351), and

Recommends

1. that the terms *lunisolar precession* and *planetary precession* be replaced by *precession of the equator* and *precession of the ecliptic*, respectively,
2. that, beginning on 1 January 2009, the precession component of the IAU 2000A precession-nutation model be replaced by the P03 precession theory, of Capitaine *et al.* (2003, *A&A*, **412**, 567-586) for the precession of the equator (Eqs. 37) and the precession of the ecliptic (Eqs. 38); the same paper provides the polynomial developments for the P03 primary angles and a number of derived quantities for use in both the equinox based and CIO based paradigms,

3. that the choice of precession parameters be left to the user, and
4. that the ecliptic pole should be explicitly defined by the mean orbital angular momentum vector of the Earth-Moon barycenter in the Barycentric Celestial Reference System (BCRS), and this definition should be explicitly stated to avoid confusion with other, older definitions.

Notes

1. *Formulas for constructing the precession matrix using various parameterizations are given in Eqs. 1, 6, 7, 11, 12 and 22 of Hilton et al. (2006). The recommended polynomial developments for the various parameters are given in Table 1 of the same paper, including the P03 expressions set out in expressions (37) to (41) of Capitaine et al. (2003) and Tables 3-5 of Capitaine et al. (2005).*
2. *The time rate of change in the dynamical form factor in P03 is*

$$dJ_2/dt = -0.3001 \times 10^{-9} \text{ century}^{-1}.$$

References

- Capitaine, N., Wallace, P.T., & Chapront, J. 2003, *A&A*, **412**, 567
 Capitaine, N., Wallace, P.T., & Chapront, J. 2005, *A&A*, **432**, 355
 Hilton, J.L., Capitaine, N., Chapront, J., Ferrandiz, J.M., Fienga, A., Fukushima, T., Getino, J., Mathews, P., Simon, J.-L., Soffel, M., Vondrak, J., Wallace, P., & Williams, J. 2006, *Celest. Mech.*, **94**, 351

Actions to be taken by the General Secretary upon adoption of the Resolution *Adoption of the P03 Precession Theory and Definition of the Ecliptic*

The following institutions should receive formal notification of the action:

Her Majesty's Nautical Almanac Office, Institute de mécanique céleste et de calcul des éphémérides, Institute of Applied Astronomy of the Russian Academy of Sciences, International Association of Geodesy, (IAG), International Earth Rotation and Reference Systems Service (IERS), International Union of Geodesy and Geophysics (IUGG), International VLBI Service for Geodesy and Astrometry (IVS), Japan Coast Guard (JCG), National Astronomical Observatory of Japan (NAOJ), Nautical Almanac Office of the United States Naval Observatory.