NOMENCLATURE FOR THE CURRENT PRECESSION AND NUTATION MODELS

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ABSTRACT. For much of the last decade, the latest and best adopted precession and nutation theories were described as the IAU 2000A Precession-Nutation Model, a phrase taken from IAU 2000 Resolution B1.6. Since the adoption of a new precession theory by the IAU in 2006, that phrase has gradually been abandoned without an agreed-upon replacement. The situation is complicated not just by the new precession theory, but by the availability of an adjusted IAU 2000A nutation model that is often not distinguished in print from the original. New agreed-upon nomenclature is required to avoid confusion.

1. PROBLEMS

There are two main problems that have recently emerged, both of which can be addressed with consistent nomenclature. Problem one: the term "IAU 2000A precession-nutation model" is now an ambiguous name. There are several algorithms used for precession and nutation over the past decade that could have a reasonable claim to be part of the IAU 2000A precession-nutation model. These include the following.

For Precession:

P1: Corrections to $\Delta\psi$ and $\Delta\epsilon$, linear with respect to time, on top of the Lieske et al. (1977) precession formulation. This was the precession solution in Mathews, Herring, and Buffett (2002) referred to in IAU 2000 resolution B1.6. This is consistent with what is stated in the IERS Conventions (2010) section 5.2.1 (IERS 2010).

P2: The interim IERS precession expressions given in the IERS Conventions (2003) (IERS 2004). They are provided in the IERS Conventions (2003) in section 5.5.2 as "Precession Developments Compatible with the IAU2000A Model" under the general heading of section 5.5, "IAU 2000A and IAU 2000B Precession and Nutation Model".

P3: Capitaine et al. (2003) P03 precession, recommended by the IAU Working Group on Precession and the Ecliptic and adopted by the IAU in 2006. This is the culmination of the search for a new complete precession theory that began shortly after the 2000 General Assembly. It is now the IAU recommended model.

For Nutation:

N1: The MHB nutation series. This is the series presented in Mathews, Herring, and Buffett (2002) referred to in IAU 2000 resolution B1.6.

N2: The MHB nutation series with corrections for P03 precession. The small additional corrections are from Wallace and Capitaine (2006) and are needed for the IAU adopted nutation and precession to be consistent at the highest levels of precision.

Problem two: groups are now using their own, often different names for precession-nutation models. This leads to confusion for software developers incorporating "IAU precession-nutation", for users that need to understand the data they are using, and for people trying to clearly document their work. Some example of different terminology include the following.

- IERS 2010 uses "IAU 2006/2000A".

- For nutation, IERS 2010 recommends N2 be designated "IAU $2000A_{R06}$."
- Standards of Fundamental Astronomy (SOFA) uses "00A" suffix for the combination of P1 and N1.
- SOFA uses "06A" suffix for the combination of P3 and N2.
- The Astronomical Almanac uses only P3 for precession but both N1 and N2 for nutation. These are termed "IAU 2006" precession and "IAU 2000A" nutation. There are no different designations between the two nutation models, but rather the differences are described within the text.
- The Explanatory Supplement to The Astronomical Almanac (Urban and Seidelmann 2012) uses "IAU 2006/2000A" for the combination of P3 and N1, and "IAU $2006/2000A_R$" for P3 and N2, when a distinction is needed.
- Use of the name "IAU 2000A" precession-nutation is dwindling.

2. GOAL

The goal of this discussion is to agree on standard nomenclature to unambiguously define which algorithms are being used. Emphasis should include accommodating names currently or recently in use, if practical.

3. PROPOSALS AND DISCUSSION

Four proposals were put forward in order to foster discussion. They included using "IAU 2000A" precession-nutation as either a generic name to any pair of precession-nutation algorithms described earlier or as a specific name for P1 + N1. Also, the proposals included "IAU 2006/2000A" precession-nutation being the specific name of P3 + N1, and "IAU $2006/2000A_{R06}$" being the specific name of P3 + N2. Any combination of models not explicitly defined should be described within the document in which they appear.

Due to another set of nomenclature items (see McCarthy, this issue), discussion on the four proposals was effectively shelved. Instead, the participants agreed that an IAU Division I "standing committee" should be formed to deal with these and future nomenclature issues.

4. REFERENCES

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