IERS Conventions Centre

Report to the 16th session of the CCTF

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Uniformity in the definition of space reference systems is becoming increasingly important to basic metrology. Such uniformity is essential for activities that use sets of measurements that are not local, as is the case of the astro-geodetic techniques contributing to the International Earth Rotation and Reference System Service (IERS). Since January 2001, the Conventions Centre of the IERS is provided jointly by the Bureau International des Poids et Mesures (BIPM) and the U.S. Naval Observatory (USNO). Over the period 2001-2003, the work accomplished or in progress is the following.

1. Edition of the *IERS Conventions (2003)*

The *IERS Conventions (2003)* is a 128-page book defining the standard reference systems realized by the IERS along with the models and procedures used for this purpose. It is organized in eleven chapters.

Chapter 1 General Definitions and Numerical Standards
Chapter 2 Conventional Celestial Reference System and Frame
Chapter 3 Conventional Dynamical Realization of the ICRS
Chapter 4 Conventional Terrestrial Reference System and Frame
Chapter 5 Transformation Between the Celestial and Terrestrial Systems
Chapter 6 Geopotential
Chapter 7 Displacement of Reference Points
Chapter 8 Tidal Variations in UT1
Chapter 9 Tropospheric Model
Chapter 10 General Relativistic Models for Space-Time Coordinates and Equations of Motion
Chapter 11 General Relativistic Models for Propagation

The most significant changes from previous IERS conventions (1996) are due to the incorporation of the recommendations of the 24th IAU General Assembly held in 2000. These recommendations clarify and extend the concepts of the reference systems in use by the IERS and introduce a major revision of the procedures used to transform between them. A new theory of precession-nutation has been adopted by the IAU and this is introduced in this document. The IAU2000 recommendations also extend the procedures for the application of relativity. Other major changes are due to the adoption by the IERS of a new Terrestrial Reference Frame (ITRF2000), the recommendation of a new

geopotential model and the modification of the solid Earth tide model to be consistent with the model of nutation.

The final edition of the IERS Conventions (2003) was submitted to the IERS Central Bureau in November 2003. The corresponding files are available on http://maia.usno.navy.mil/conv2003.html. This electronic release was announced in IERS message 49, and accompanied by a questionnaire to the general IERS community asking for comments on the present version and future evolution of the IERS Conventions.

2. Preparation for future versions of the Conventions

The IERS Conventions Centre intends to provide updated versions of the Conventions in electronic form, after proper approval of the IERS Directing Board. These editions will be clearly marked regarding the date of their electronic publication. In the mean time, work on interim versions will also be available by electronic means. Work is currently under way to prepare for this new electronic maintenance. In addition to the electronic releases, printed versions of the Conventions will be provided at less frequent intervals or when major changes are introduced.

On the technical issues, topics are being identified as needing investigation and possible new developments for future versions of the Conventions. Several such topics concern contributions to the difference between the instantaneous position of a site and its regularized position, such as the effects of geocenter motion or atmospheric loading.

3. Studies on the consistency of Conventions and IERS products

The BIPM has provided for a visiting scientist to conduct studies on the consistency of the Conventions and IERS products. Jim Ray, from the U.S. National Geodetic Survey, has taken this one-year position from September 1, 2003.

The Conventions Centre contributes to the ongoing work to implement new conventional models and procedures. Some important topics for the future include geocenter motion, impact of using global as opposed to local loading models, and network effects in the solutions of different techniques. It also will participate in new studies, such as the development of rigorous multi-technique product combinations, through collaboration in the new IERS Combination Pilot Project.

4. References

- Mc Carthy D.D., Petit G., IERS Conventions, IAU Joint Discussion 16, Sydney, 2003.
- Ray J., Petit G., Altamimi Z., Requirements for improved definitions and realizations of the ITRF origin and geocenter motion, AGU Fall Meeting, San Francisco, 2003.

- Mc Carthy D.D., Petit G., IERS Conventions (2003), Verlag des BKG, 2004.

Individuals participating in the Conventions Center are
For the BIPM: Dr. Gérard Petit, co-director of the CC, representative to the IERS Directing Board for 2004-2006, Dr. Elisa Felicitas Arias, Dr. Peter Wolf.
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