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The ephemerides server of the Institut de mécanique céleste et de calcul des éphémérides

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The Institut de mécanique céleste et de calcul des éphémérides (IMCCE), formerly known as Bureau des longitudes, produces, since its creation (1795), the French ephemerides for most of the bodies of the solar system. More, the IMCCE produces ephemerides of stars on the demand of the users.

The IMCCE publishes yearly the Connaissance des temps, founded in 1679 and based upon the most recent dynamical models (original analytical theories, elaborated in the Institute), the Annuaire du Bureau des longitudes containing ephemerides of small precision for the general public use and Nautical ephemerides, since 1889, for navigation. Ephemerides of asteroids and comets are also available through specific Notes Scientifiques et Techniques at IMCCE. The ephemerides of IMCCE are maintained thanks to research activities in the area of dynamics, celestial mechanics and astronomy. They lead to elaboration of theories of motion of the solar system objects.

Along with these publications of ephemerides, IMCCE makes available an ephemeris server either on the French Minitel network (36 15 BDL) for the general public use or on an interactive server of ephemerides computation, at the address, http://www.bdl.fr, available on Internet, to calculate the positions of the solar system bodies as well as their physical parameters. This Internet server proposes several services; among them, the ephemerides service provides different types of ephemerides.

First, the general ephemerides of the solar system provide right ascension and declination of most of the solar system bodies in any reference frame (heliocentric, topocentric, planetocentric, geocentric, topographic, horizontal, ecliptic J2000, apparent, geometric). These ephemerides are available for different theoretical models such as DE200, DE403, DE405, DE406 and VSOP82, VSOP87 for the planets.

Second, the ephemerides for physical observations designed especially for the observers at the surfaces of the objects of the solar system. Longitude of the central meridian, planetocentric declinations of the Sun and the Earth are provided

as well as planetocentric longitudes and latitudes of the sub-earth and sub-solar points, position angle of the planet North pole, apparent radius, visual magnitude, phase angle, distance from the Earth and the Sun, position angle of the planet intensity equator, apparent configuration of the solar system bodies (planets, natural satellites, some asteroids). A graphic representation is proposed in postscript format together with the table of number.

Third, specific ephemerides for the natural planetary satellites are available: first, equatorial geocentric coordinates as seen above and second, relative ephemerides to the planet in the tangential plane, and geometric rectangular ephemerides.

Fourth, ephemerides for the celestial phenomena are provided. The timings of sunsets and sunrises and the same for the Moon and the planets are available for any location on Earth. Eclipses of the Sun and eclipses of the Moon are predicted for several years, lunar eclipses between 1997 and 2010 and solar eclipses between 1998 and 2004. Data for calendars, holidays, seasons, phases of the Moon are also available. Phenomena of the Galilean satellites of Jupiter and of Saturn are also provided.

Numerous data are available on the FTP server [1] such as ephemerides under the form of coefficients allowing anyone to build their own ephemerides for a specific interval of time and tables; elements of orbits (for asteroids and comets) allowing anyone to build orbits for these bodies. The code of several theoretical models is provided.

The ephemerides server displays also data and tools as astronomical data and parameters for the observation of the solar system objects such as cometary notes of the IMCCE, astronomical glossary, the StarField Map server and a conversion between calendar date and Julian date.

Tools for observers are provided for astrometric observations (reduction, etc.) and for the observation of the phenomena of the natural planetary satellites, especially for the next campaign of observation of the mutual events of the Galilean satellites (http://www.bdl.fr/phemu03_eng.html).

References

1. Baron N., Emelianov N. La collecte des observations et le calcul ces éphémérides, Journées Scientifiques de l'Institut de mécanique céleste et de calculs des éphémérides, 2000.