

CHAPTER 12 LUNAR AND PLANETARY EPHEMERIDES

The planetary and lunar ephemerides recommended for the IERS standards are the JPL Development Ephemeris DE200 and the Lunar Ephemeris LE200. These have formed the basis for the Astronomical Almanac since 1984. DE200/LE200 should be used in the analysis of SLR and VLBI. However, in LLR analysis, parameters of the Earth-Moon system should be fit or a more recent lunar ephemeris should be used.

The ephemerides, DE200/LE200, were created from the 1950-based ephemerides, DE118/LE62. Their orientation with respect to the dynamical equinox of J2000.0 was described by Standish (1982).

Associated with the ephemerides is the set of astronomical constants used in the creation of the ephemerides which are listed in Table 12.1. Many of these values do not agree exactly with those of the IAU 1976. The difference, listed in Table 12.2, has been necessary in order to provide a best fit of the ephemerides to the observational data. These constants are provided directly with the ephemerides and should be considered to be an integral part of them.

Table 12.1. JPL Planetary and Lunar Ephemerides DE200/LE200

Scale (km/au)	149597870.66
Speed of light (km/sec)	299792.458
Obliquity of the ecliptic	23° 26' 21"4119
Earth-Moon mass ratio	81.300587
GM(Sun)/GM(Mercury)	6023600
GM(Sun)/GM(Venus)	408523.5
GM(Sun)/GM(Mars)	3098710
GM(Sun)/GM(Jupiter)	1047.350
GM(Sun)/GM(Saturn)	3498.0
GM(Sun)/GM(Uranus)	22960
GM(Sun)/GM(Neptune)	19314
GM(Sun)/GM(Pluto)	130000000
GM(Sun)/GM(Earth+Moon)	328900.55

Table 12.2. IAU Values Which Differ From Those of DE200/LE200

Scale (sec/au)	449.004782
(149597870.15...km/au)	
Moon-Earth mass ratio	0.0123002
(E/M = 81.30068...)	
Obliquity of the ecliptic	23° 26' 21".448
GM(Sun)/GM(Jupiter)	1047.355
GM(Sun)/GM(Saturn)	3498.5
GM(Sun)/GM(Uranus)	22869
GM(Sun)/GM(Pluto)	3000000
GM(Sun)/GM(Earth+Moon)	328900.5

REFERENCES

Standish, E. M., 1982, "Orientation of the JPL Ephemerides, DE200/LE200, to the Dynamical Equinox of J2000," Astron. Astrophys., **114**, pp. 297-302.