

PROGRAMS OF AES EPHEMERIDES CALCULATION

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ABSTRACT. A program of AES ephemerides calculation is developed which permits, from the given set of elemental orbit, to calculate ephemerides for several months' period.

Key words: orbital date, ephemeris service

In order to provide for normal positional observations the software is needed for recalculating AES position in orbit for any preset time moments from the known elements of AES orbit.

In DC OGU, the programs have been made up of AES ephemerides calculation which can work in the following regimes:

a) calculation of ephemerides for passive optical observations. In this regime, ephemerides are calculated only for the sunlit satellites and those visible in the dark part of the day (astronomical twilight and astronomical night) and being over some preset height above the observer's horizon. The program also permits to make calculations for other observational conditions as well. Ephemerides can be calculated with any set time step;

b) Calculation of ephemerides for laser optical observations. In this case ephemerides are calculated for all the night transits of a satellite above the observer's horizon as well as in the Earth's shadow;

c) Calculation of ephemerides for radiolocation observations. In this regime, the conditions of the satellite being sunlit and the observer being in the night part of the Earth are entirely discarded, that is ephemerides are calculated for all the AES transits above the observer's horizon. The program permits to

make calculations for other observing conditions, too. Ephemerides can be calculated with any preset time step. Taking account of the motion of an ascending node and the orbit perihelion enables to calculate ephemerides for several months' period (when strong solar - atmospheric perturbations are absent) from the given set of elements of the orbit.

It should be also noted that programs elaborated by us were given trial throughout the seasons of observations in 1995-1996 for their testing and finding flaws which needed checking, correction, refinement. With their help, within the above seasons ephemerides were many a times calculated for observations of satellites "Okean-7" and "Sich-1". Calculations showed the ephemerides to remain precise enough for these satellites for three months, so, during observations on September 11th, 1996, satellite "Sich-1" was nearly 30 seconds slow as compared with ephemeris time. In early observational season of 1997 (February), from the data obtained from NTS RKI (rectangular equatorial coordinates of an ascending node), elements were determined of the orbit of middle component "bundle" - a group of satellites consisting of three objects. Ephemerides calculated from these elements under good weather conditions made it possible to carry out optical observations of these satellites up to the very end of their optical visibility period (February 19), and then after the advent of a new period of their visibility. The observations made once again confirmed a good quality of calculated ephemerides, and consequently the algorithms and programs elaborated at DC AO OSU being correct.