

## Conversion of Classical Orbital Elements

OSMEAN converts mean to osculating elements or vice versa.

OSMEAN is a sophisticated FORTRAN program that converts between osculating and mean classical orbital elements. Mean orbital elements are advantageous for designing trajectories and planning maneuvers because they can be propagated very quickly. However, mean elements cannot describe the exact orbit at any given time. Osculating elements enable an engineer to give an exact description of an orbit, but the cost of computational is significantly greater because of the numerical integration procedure required for propagation.

By calculating accurate conversions between osculating and mean orbital elements, OSMEAN enables the engineer to exploit the advantages of each approach for the design and planning of orbital trajectories and maneuvers. OSMEAN can convert mean elements to osculating elements or vice-versa. The conversion is based on mathematical modeling of all first-order aspherical terrestrial, lunar, and solar gravitational perturbations plus a second-order aspherical term based on the second-degree central-body

zonal perturbation.

OSMEAN is written in FORTRAN 77 for HP 9000-series computers running HP-UX (NPO-18796) and DEC VAX-series computer running VMS (NPO-18741). The HP version requires 388K of random-access memory for execution, and the DEC VAX version requires 254K of random-access memory for execution. Sample input and output are listed in the documentation. Sample input is also provided on the distribution medium. The standard distribution medium for the HP 9000-series version is a 0.25-in. (6.35-mm) streaming-magnetic-tape cartridge in UNIX tar format. This version is also available on a 0.25-in. (6.35-mm) streaming-magnetic-tape cartridge in IOTAMAT format or on a 3.5-in. (8.89-cm) diskette in UNIX tar format. The standard distribution medium for the DEC VAX BACKUP format. It is also available on a TK50 tape cartridge in DEC VAX BACKUP format. OSMEAN was developed on a VAX 6410 computer in 1989 and was ported to the HP 9000-series computers in 1991. It is a copyrighted work with all copyright vested in NASA.

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