

ORBIT DETERMINATION OF SOLAR SYSTEM OBJECTS

Ementa:

- Summary of celestial mechanics: Two-body problem, 3-body problem, N-body problem, perturbations of motion, osculating elements.
- Numerical integration: Principle of numerical integration, Euler method, order of method, 2nd order method, consistency, convergence and stability of methods, Runge-Kutta, Gauss-Radau, Bulirsch-Stoer
- Astrometry and measurements: Astrometrical observations, Radar measurements. Reference frame, light-time correction, aberration correction.
- Orbit determination: Preliminary orbit (Gauss method, Laplace method, Vaisala method, Statistical ranging), Fitting process (least-squares method).
- Orbit uncertainty Propagation of the covariance matrix, Monte Carlo process. Applications (Near-Earth objects, lost asteroids, ...)

Bibliografia:

Articles:

- ◀ Fox K., Numerical integration of the equations of motion of celestial mechanics, *Celestial Mechanics*, 33, 127, 1984
- ◀ E. Everhart. An efficient integrator that uses Gauss-Radau spacings. In *Dynamics of Comets : Their Origin and Evolution*, volume 83 of *Proceeding of IAU Colloq.*, 1985. 25

Books:

- ◀ Seidelmann, P. K. (Ed.). (2005). *Explanatory Supplement to the Astronomical Almanac: A Revision to the Explanatory Supplement to the Astronomical Ephemeris and the American Ephemeris and Nautical Almanac*. University Science Books.
- ◀ Danby J. M. A., *Fundamentals of celestial mechanics* . Richmond : Willman-Bell, 2nd ed., 1992.