ATESAT: A SYMBOLIC PROCESSOR FOR ARTIFICIAL SATELLITE THEORY

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We are dealing with the problem of the analytical simplifications in the artificial satellite theory. The satellite is assumed to be a negligible mass point and the Earth's attraction is the only force acting on it.

The main goal is to obtain —automatically— an integrable Hamiltonian by means of a set of canonical transformations based on the Lie transform [4] and without expansions in the eccentricity. The first simplification to be made is the algorithm of relegation [7] that avoids the effect of the tesseral harmonics. The second one is the elimination of the parallax [5] that transforms all the terms of the form r^{-n} into r^{-2}. The elimination of the perigee [3] eliminates this variable from the Hamiltonian. After these transformations we reach a one degree of freedom problem, that an its ready to integrate easily by the Delaunay Normalization [6].

MALISIAS (MAthematica LIe SImplification in Artificial Satellite) was our first attempt to solve symbolically this dynamical system. MALISIAS [7] is a set of packages built in *Mathematica*, that provides the generating function, the reduced Hamiltonian