and the equations of the transformations after performing the above mentioned simplifications. This approach helped us to understand the characteristics of the symbolic manipulation of the Lie transformation, but unfortunately, the size of the expressions involved exceeded the capacity of the general symbolic systems.

In this theory, as well as in other fields of non-linear dynamics, the main mathematical object to manipulate belongs to a particular algebraic structure: the Poisson Series. The only way to obtain high orders of the transformations is by means of an specific algebraic manipulator written specially for handling efficiently these objects. In order to have a more efficient tool for the satellite theory we create PSPC [1], a Poisson Series Processor in language C.

By using PSPC we build ATESAT (Automatization of Theories and Ephemeris in the SATellite problem). With ATESAT [2] we reviewed and enlarged the possibilities of MALISIAS and added to it a few new utilities. In particular, ATESAT writes automatically a C–code of an ephemeris program for the chosen theory. With ATESAT we are able to reach high orders in the satellite theory including not only the main problem but zonal or tesseral harmonics.

References

[1] Abad, A. & San Juan, J. F., PSPC: A Poisson Series Processor coded in C, *Dynamics and Astrometry of Natural and Artificial Celestial Bodies, Poznan, Poland*, pp. 383–389 (1993).