

Long time integrations of the Solar System

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Long time integration of the planetary motion in the Solar System has been a challenging work in the past decades. The progress have followed the improvements of computer technology, but also of improvements in the integration algorithms. This quest has led to the development of high order dedicated symplectic integrators that have a stable behavior over long time scales. As important in the increase of the computing performances is the use of parallel algorithms that have divided the computing times by an order of magnitude.

Integrating the equation of motion is only a part of the work. One needs also to determine precise initial conditions in order to ensure that the long time integration represent actually the motion of the real Solar System.

Once these steps are fulfilled, the main limitation in the obtention of a precise solution of the planetary motion will be given by the chaotic nature of the Solar system that will strictly limit the possibility of precise prediction for the motion of the planets to about 60 Myr.