

# **Numerical simulation of the motion of small bodies of the Solar System by the symbolic computation system "Mathematica".**

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The problem of numerical simulation of the motion of the Solar System's small bodies with various length of computer word (in decimal digits) have been solved by the symbolic computation system "Mathematica". The problem of  $N$  bodies and the perturbed two-bodies problem have been considered.

The substantiation of various methods for estimation of accuracy of numerical integration are given. It is shown that the using of computer word with large number of decimal digits can be very useful for the studying of close approaches of small bodies with large planets.

Furthermore the problem of estimation of initial orbital parameters of small bodies' motion with computer word of large length have been considered. The using of large number of decimal digit positions can be very essential for solving ill-condition problems of calculation of the motion's parameters and acting forces. The determination of orbit of near-Earth asteroids observed at single-apparition is considered as an example of application of the developed software.