Numerical simulation of the motion of Martian satellites

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Effective algorithms of numerical simulation of the motion of Martian moons Phobos and Deimos are given. These algorithms have been constructed using Enke-form of differential equations of the motion and regularizing and stabilizing Kustaanheimo-Stiefel variables. The influences of harmonics of areopotential and the Sun and the tidal effects have been taken into account in the process of simulation, the interval of time equals the period covered by observations of the satellites. Initial conditions of the motion have been calculated and improved by Chapront-Touze analitical theory.

Final refinements of Fobos and Deimos orbits have been made using observational data covered interval of time from discovering of satellites to present moment. Furthermore authors have made attempts to estimate secular accelerations of the satellite's motion and parameters of tidal deformations of the areopotential. Results of these estimations are presented.

In addition a brief description of software which have been constructed for solving such problems as the calculation of high-precision ephemerids, the orbit's improvement, the determination of parameters of gravitational field and tidal coefficients, the investigation of the long-time evolution of satellite's orbits are given.