

Investigation of the Evolutionary Equations of the Two-Planetary Problem of Three Bodies with Variable Masses

Authors : Zhanar Imanova

Abstract : Masses of real celestial bodies change anisotropically and reactive forces appear, and they need to be taken into account in the study of these bodies' dynamics. We studied the two-planet problem of three bodies with variable masses in the presence of reactive forces and obtained the equations of perturbed motion in Newton's form equations. The motion equations in the orbital coordinate system, unlike the Lagrange equation, are convenient for taking into account the reactive forces. The perturbing force is expanded in terms of osculating elements. The expansion of perturbing functions is a time-consuming analytical calculation and results in very cumbersome analytical expressions. In the considered problem, we obtained expansions of perturbing functions by small parameters up to and including the second degree. In the non resonant case, we obtained evolution equations in the Newton equation form. All symbolic calculations were done in Wolfram Mathematica.

Keywords : two-planet, three-body problem, variable mass, evolutionary equations

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