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OPTIMAL CONTROL OF SOLAR SAIL SPACE SYSTEM FOR MONITORING OF POTENTIALLY DANGEROUS ASTEROIDS

Abstract

A monitoring system, which consists of three spacecraft with a solar sail, was considered. These space crafts will be located in halo orbits near the L3, L4, L5 libration points of the Sun-Venus to monitor potentially dangerous objects. Such an arrangement can detect objects coming the Earth from the Sun. In addition, using the solar sail will increase the system lifetime. The mathematical model of the control movement of the solar sail spacecraft within the framework of the restricted four-body problem was formed. In this paper, the optimal control programs of a solar sail on the stages of launch and operation was received. The minimal transfer duration for the spacecraft with different kinds and design characteristics of the sail were estimated. A simulation, confirming the adequacy of the selected mathematical models and control laws was carried out. The minimal transfer duration for the spacecraft with different kinds of sail and design characteristics are estimated. The parameters of the optical system for continuous coverage of the Earth's orbit were calculated.