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THE MISSION'S DESIGN OF A SOLAR SAIL SPACECRAFT TO THE NEAREST CIRCUMSOLAR SPACE, BASED ON A LOCALLY-OPTIMAL CONTROL LAWS

Abstract

Ballistic design of the mission in the near circumsolar space is composed of a variety of control programs and the corresponding trajectories, which provide performance goals and satisfy the set of constraints. The use of a solar-sail spacecraft imposes additional restrictions on mission parameters. These include limits on the flight duration, the minimum distance from the Sun, the maximum angular velocity of the spacecraft's rotation and many others. Obtaining an exact optimal solution to such a complex problem is associated with significant theoretical and computational difficulties. This paper describes the mission's design to the immediate Sun's vicinity (20 Sun's diameter) performed using the technique of designing interplanetary flights, based on the use of local-optimal control laws. This method allows determining such a combination of these laws, which ensures that all requirements of the mission.