UDC 629.19.50

V. G. KOMAROV

OPTIMAL TRAJECTORIES OF SPACECRAFT UNDERGOING DISCONTINUOUS CHANGES IN ITS PARAMETERS

The work objective is to examine optimal coplanar trajectories of the spacecraft with parameters undergoing discontinuous changes within a certain time in the central-force Newton field.

The Pontryagin maximum principle for cases of discontinuous changes in parameters and coordinates is used as a research method.

Desired conditions of an optimal spacecraft control considering discontinuity are found.

The results can be employed to design trajectories of the near space flight of multistage rockets, as well as trajectories for the moon-planetary flights.

Keywords: *spacecraft, discontinuity, optimality, control, parameter, mass, time, motion, orbit, transition, trajectory, maximum principle.*

1. Studies of Optimal Conditions of Rocket Motion: Collected Papers (in Russian). – Moscow : Oborongiz, 1959. – 293 p.
2. Methods of Optimization with Applications to Space Flight Mechanics (in Russian) / Edited by *J. Leitmann*. – Moscow : Nauka, 1965. – 538 p.
3. *Komarov V. G.* An approach to studies of optimal transfer trajectories between coplanar orbits (in Russian) / *V. G. Komarov* // Kosmicheskie Issledovania na Ukraine. – 1982. – Issue 16. – P. 7 – 73.
4. *Grigoriev K. G.* Optimal deployment of spacecraft from the Moon surface into circular orbit of its satellite (in Russian) / *K. G. Grigoriev, M. P. Zapletin, D. A. Silaev* // Kosmicheskie Issledovania na Ukraine. – 1991. – Vol. 29, Issue 5. – P. 695 – 704.
5. *Elyasberg P. Ye.* Introduction to Theory of Flight of Earth Satellites (in Russian) / *P. Ye. Elyasberg*. – Moscow : Nauka, 1965. – 540 p.
6. *Komarov V. G.* Principle of maximum for problems of optimal control characterized by discontinuous changes in parameters (in Russian) / *V. G. Komarov* // Dynamics and Control of Motion: Collected Papers. – Kiev : Naukova Dumka, 1978. – P. 14 – 17.
7. *Troitskiy V. A.* Optimal Processes of Oscillation of Mechanical Systems (in Russian) / *V. A. Troitskiy*. – Leningrad : Mashinostroyenie, 1976. – 248 p.
8. *Komarov V. G.* Solution of some problems of optimal spacecraft control in quadratures (in Russian) / *V. G. Komarov* // Tekhnicheskaya Mekhanika. – 2012. – No 3. – P.98 – 111.