

IAF SPACE PROPULSION SYMPOSIUM (C4)  
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ELECTRIC PROPULSION'S RATIONAL APPLICATION RANGE ON THE SMALL SPACECRAFTS

**Abstract**

The time of descent of the satellites into the dense layers of the atmosphere can be greater than the time of the proposed active existence for sufficiently large heights of the orbits of the satellites. Continuous support for orbit parameters is most relevant in low Earth orbits. Flight Control's SETS department is developing various HET engines that have good performance and can be used to solve these problems. The paper discusses the prospects for the use of engines to maintain the orbit of Earth remote sensing satellites in low Earth orbits. Comparison of the field of application of SETS HET and traditional chemical thrusters for similar tasks is carried out. The trajectory parameters were calculated by numerical solving the differential equations of the motion of a spacecraft in the gravitational field of the earth under the influence of solar radiation in a rarefied atmosphere of the Earth. The control system was considered such that it changes the daily time the engine is turned on to maintain an orbit height. Such a scheme for modeling the operation of the control system makes it possible to take into account the change in disturbing factors that are not known in advance. A comparative analysis of chemical thrusters and HET was performed. The mass of the ET propulsion system is less than the chemical thruster system for altitudes less than 450 km due to a significant reduction in the mass of fuel. The masses of the compared systems are commensurate for orbit heights of the order of 500km. The weight reduction of the HET propulsion system will be more than 2 times when it is used instead of a chemical thruster at altitudes from 300 to 450km. The results obtained can be used both in the design of new spacecraft and in the modification of existing solutions to obtain more efficient use of the launch mass of the satellite. The main result of this study should be to ensure the most efficient use of the starting mass of the satellite. The considered methods of calculation can be useful in obtaining the necessary characteristics of newly created thrusters designed to solve similar problems.