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SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

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INVESTIGATION OF A MICRO ION THRUSTER FOR MICROSATELLITES

Abstract

An exciting possibility for the next generation of satellite technology is the mcirosatellite. These satellites, ranging in size from 10-500 kg, can offer advantages in cost, reduced risk, and increased functionality for a variety of missions. For station keeping and control of these satellites, a suitable compact and high efficiency thruster is required. Electric propulsion provides a promising solution for microsatellite thrust due to its high specific impulse.

An investigation has been undertaken to understand and help develop a micro ion thruster for use on microsatellites. A multiphysics software package was used to model a several micro ion thruster designs. The different designs were created to test scaling effects on the various thrusters, in regards to global performance figures such as a specific impulse or thrust. A unique, channel-based geometry was also tested. This geometry is interesting as it may be manufactured at low cost using semiconductor techniques. The design channel design would also be modular, allowing direct scalability to a large range of satellite and mission requirements.

Further, the possibility of creating an micro hybrid thruster is explored. This thruster would seek to couple technologies from ion thrusters and Hall Effect thrusters to overcome space-charge and lifetime limitations of current ion thruster technologies. The results and conclusions of these models will be given in the full paper.