

SPACE PROPULSION SYMPOSIUM (C4)

Poster Session (P)

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SPACE PROPULSION SYSTEM USING EARTH'S MAGNETIC FIELD

Abstract

Space technology has become a significant platform to experiment the scientific laws. Today most of our operations on earth are space governed by using spacecraft. Small satellites have become the most effective tool for space engineering and are expected to become an effective tool for real mission with low cost and short development period. Provision for orbital manoeuvre as well as attitude control effectively is very complex to incorporate due to the constrained size, cost, and weight. This thesis emphasizes on the need for propulsion system which makes use of Earth's magnetic field. The system incorporates a telescoping reinforced aluminium rod as conductor which is surrounded by ionized plasma from solar wind trapped in ionosphere and can be extended to variable length. One end of the conducting rod receives electrons and other emits forming a closed loop. This conducting rod functions as motor as well as generator. The electric current developed by solar arrays when passed through the conductor in the presence of Earth's magnetic field produce Lorentz force the direction of which depends on that of current and can be varied accordingly. This varying force can be used to perform orbital maneuver and eradicate the complexity involved in commercial propulsion system. The advantages of the system are:

- It is continuously available
- The force can be varied by varying current and the direction of current to perform required maneuver.
- It is cost effective, requires no fuel and is of less weight.
- This varying force can also be used to change inclination and eccentricity.
- By varying the direction of force inter-orbital maneuvers can be done.

The advantages of the proposed propulsion system make its application a paramount requirement over other existing propulsion systems for next generation space operations.