

SPACE PROPULSION SYMPOSIUM (C4)  
Electric Propulsion (4)

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## FEASIBILITY STUDY OF AIR-BREATHING PULSED PLASMA THRUSTER

**Abstract**

Recent years showed an increased activity in the field of air-breathing electric as well as beamed-energy propulsion systems in order to extend lifetime of satellites in LEO. However, preliminary studies showed that the propellant flow necessary for electrostatic propulsion exceeds the mass intake possible within reasonable limits. Pulsed plasma thruster can be successfully operated with smaller mass intake, and operate at relatively small power demands which makes them an interesting candidate for small satellite application in LEO. In this study, the feasibility of an air-breathing PPT is evaluated. A brief review of current air-breathing electric propulsion is included as well as a summary on atmospheric models. Performance of air-breathing PPT technology is evaluated based on flight heritage, recent modelling improvements, and experimental data for gas-fed PPT. Size and mass of the thruster system are put into consideration together with mission requirements. Recommendations for possible future flight applications are eventually derived.