

SPACE PROPULSION SYMPOSIUM (C4)

Electric Propulsion (4)

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HIGH SPEED PHOTOGRAPHY INVESTIGATION ON PLASMA PLUME OF THE ABLATIVE
PULSED PLASMA THRUSTER

Abstract

Ablative pulsed plasma thruster (APPT) is very suited for attitude control, orbital transfer, resistance compensation, station keeping, formation flying of microsatellite and the main propulsion system of deep space exploration, because of its significant advantages with regard to construction simplicity, high reliability, large range of thrust, high specific impulse, small impulse bit and low development cost. In this paper, plasma plume characteristic of APPT was investigated by high speed photography. The results indicate that the quantity of plasma is proportional to intensity of discharge current and changes periodically. In the initial phase of operation, thickness of plasmas layer is almost uniform near the ablation surface. As the plasma moves forward, two plasma microspheres appear near the electrodes, and then the two microspheres intersect at some area of discharge channel. In the later period of operation, there is only a filamentous current channel near the ablation surface.