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Experimentally Study of Micro-Cathode Arc Thruster (μCAT)[1]
TAISEN ZHUANG, ALEXEY SHASHURIN, DERECK CHIU, GEORGE TEEL, The George Washington University, ISAK BEILIS, Tel Aviv University, MICHAEL KEIDAR, The George Washington University — A micro-Newton level cathode arc thruster (μCAT) with magnetically enhanced system has been proposed to address the long-time operation of micro-thruster for the nano-satellite propulsion. One important parameter governing the thrust force is velocity of the ions. In this work, we present the methodology of the Ti ion velocities measurement produced by μCAT and especially address the influence of magnetic field on the ion motion. The ion velocities are studied by means of time-of-flight (TOF) method equipped with enhanced ion detection system (EIDS). The EIDS method consists of perturbations (spikes) on arc discharge current waveform to generate denser plasma bunches and following detection of moments of time when perturbations arrives at the detectors. The novel double probes ion detection system could overcome the problem of noise generation simultaneously with the arc current perturbation associated with utilization of conventional single probe detector. When plasma bunch crosses each of the double probes, the spike on the probe current is detected following variation of plasma density. By measuring the delay times between the neighbor probes the average ion velocity can be determined. The Ni ion velocities are measured to compare with Ti ion velocities.

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