

PLASMA ROTATION IN A MICRO-VACUUM ARC THRUSTER

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Micro-Vacuum Arc Thruster (μ VAT) is a magnetically enhanced scaled down version of a vacuum arc thruster with an objective to provide a long-time operation. This work will outline recent experimental results, discuss an interesting new physical phenomena discovered as well as present other possible application of this plasma source.

Rotation of cathode spot as a result of an applied magnetic field is demonstrated by using Langmuir probes inserted inside the source channel azimuthally. Special assemble of concentric circles plan probe was used to measure the ion current distribution outside the thruster channel and 12-probe set up is used to measure plasma rotation in the plasma plume. It is shown that plasma generated at the cathode spot is guided along the magnetic field line. Our experiments suggest that the plasma source produces rotating plasma that follows the rotation of cathode spot in retrograde direction. Significantly, magnetic field can efficiently guide the plasma leading to increase of the output ion current by a factor of 50 in comparison to that without the magnetic field. In addition, ion velocity dependence on the magnetic field is studied using the time of flight technique. Thin film deposition under effect of the magnetic field is analyzed.