SPATIALLY RESOLVED STUDY OF INTER-CUSP TRANSPORT AND CONTAINMENT OF PRIMARY ELECTRONS IN A LINE CUSP SOURCE

Aimee A. Hubble and John E. Foster
University of Michigan, Department of Nuclear Engineering and Radiological Sciences, 2355 Bonisteel Blvd. Ann Arbor, MI 48109 USA

The physics of plasma losses at magnetic cusp surfaces in multipole ion sources remains a poorly understood problem. Loss area in these sources determines discharge ionization performance, efficiency, and stability. In previous work, electron current density profiles were obtained in the region above a magnetic cusp in a 20 cm partial conic ring cusp ion thruster discharge chamber to study electron collection mechanics in the absence of gas flow and plasma production. This work characterizes primary electron losses in a line cusp source by obtaining electron current density profiles in the region above three magnetic line cusps arrayed on a flat plate anode. The flat plate geometry will allow for the investigation of the effect that cathode/anode geometry and magnetic cusp symmetry plays in particle collection. The current density maps allow for particle transport through the cusps to be visualized. These results will be compared to the present work to study how source geometry affects particle collection.