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Performance Characterization of Ion Thruster with Isolated Magnet Rings NEIL ARTHUR, JOHN FOSTER, Univ of Michigan - Ann Arbor — Many ion sources use magnetic multipole confinement to increase the primary electron containment length. The magnetic circuit increases ion source efficiency and plasma density. A multipole source consists of rings or rows of magnets of alternating polarity. In multipole sources, the bulk of the discharge current is collected at the magnet surface, through the relatively narrow leak width. Ion engines for space propulsion are one application of multipole ion sources. Here we characterize a four ring, broad beam ion source under simulated beam extraction using typical performance metrics for ion engines while biasing the magnetic rings individually. By biasing the magnetic cusps, through isolated, conformal electrodes placed on the magnet rings, the current distribution to each individual cusp can be modified. The effect of ring bias on ion beam current, propellant utilization efficiency, and discharge losses is measured over a broad range of ring bias. Previous experiments have shown that the current distribution to the rings can be controlled, and this current distribution has tangible effects on the plasma properties and ion source operation. The goal is to gain insight into which magnetic ring current distributions will yield enhancements in engine performance.

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