Abstract Submitted
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Neutral-depletion-induced asymmetric plasma density profile and momentum transport in a helicon thruster[1] KAZUNORI TAKAHASHI, Tohoku Univ, YOSHINORI TAKAO, Yokohama National Univ, AIKI CHIBA, AKIRA ANDO, Tohoku Univ — Axial momentum lost to a lateral wall of a helicon source is directly measured by using a pendulum force balance, where only the lateral wall is attached to the balance immersed in 60-cm-diam and 1.4-m-long vacuum tank (pumping speed of 300-400 L/s). When operating the source with highly ionized krypton and xenon, the strong density decay along the axis is observed inside the source tube, which seems to be due to the neutral depletion. Under such a condition, a non-negligible loss of the axial momentum to the lateral wall is detected. The presently detected loss of the axial momentum indicates the presence of the ions which are axially accelerated by the electric field in the plasma core and then lost to the lateral wall. Furthermore, the helicon thruster immersed in 1-m-diam and 2-m-long vacuum tank (pumping speed of 4000-5000 L/s) is operated at high rf power up to 5 kW in argon, to demonstrate the neutral-depletion-induced axially asymmetric density profile. Combination between the Langmuir probe and the optical diagnosis indicates that the neutral density at the axial center of the source is reduced to 20

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