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Study of plasma thruster using ICRH in sheet plasma MIKU NISHIMURA, TOSHIKIO TAKIMOTO, AKIRA TONEGAWA, Tokai Univ, KOHNOSUKE SATO, Chubu Electric Power Co., Inc., KAZUTAKA KAWAMURA, Tokai Univ — Long-term space missions be required the ability to more widely vary thrust and specific impulse. The thrust and the specific impulse are possible to be freely controlled by the plasma production and the ion heating region are separation. We have developed a newly plasma thruster using ion cyclotron resonance heating (ICRH) in sheet plasma device, TPD-Sheet IV. The sheet plasma is a magnetized thin slab plasma which extends along a uniform static magnetic field, with a certain width, and a very small thickness. Because of these characteristics energetic ions in a sheet plasma, traverse the dense plasma region only momentarily in each cyclotron gyration. The adverse effect of collision on plasma heating by ICRH can be negligibly small, resulting the efficiency of ICRH of the sheet plasma is larger than that of the cylindrical plasma. In this study, we have demonstrated the characteristics of sheet plasma in ICRH. The propellant gas is helium at $1.34\text{e-}7$ kg/s, DC discharge power is 7 to 15 kW, the stationary magnetic field is ~ 0.1 T and RF power is ~ 300 W. Operation at an RF power level of 300W, yields a thruster of 5.9 mN and a specific impulse of 4500 s.

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