

THE HELICON DOUBLE LAYER THRUSTER

Strong electric double layers with $eF/kT_e > 5$ having thickness' less than 30 λ_D have been experimentally observed in a current free, expanding, high density helicon sustained discharge. The rapid potential decrease is associated with the 'neck' of the vacuum vessel where the glass source tube joins the aluminium diffusion chamber and is only observed when the gas pressure is less than about 0.5 mTorr. The upstream T_e appears greater than the downstream T_e and there is a density hole on the downstream edge. This experiment differs from others in that the potentials are self consistently generated by the plasma itself and there is no current flowing through an external circuit. The plasma electrons are heated by the rf fields in the source and provide the power to maintain the double layer and hence accelerate ions created in the source into the diffusion chamber. The large proportion of accelerated ions at this low pressure make the source an ideal candidate for a space plasma thruster.

The blindingly obvious is only accessible to those who wish to see.

(Attrib. to Yamamoto Kia Kasai)

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