

Abstract Submitted
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Study of Resistive Instability in a Hall Thruster SUKHMADER SINGH, HITENDRA MALIK, Indian Institute of Technology Delhi — A Hall thruster is a cross-field device in which ions are accelerated in a quasineutral plasma, because of which a Hall thruster offers much higher thrust density than other types of ion thrusters. A strong electric field is normally established in the Hall thruster channel region of large magnetic fields. This electric field is responsible for the ion acceleration. In order to improve the performance of the Hall thruster, the inner physical phenomena such as the instability of the discharge current and plasma oscillations need to be understood well. In the literature, resistive instabilities in a Hall current plasma discharge have been investigated where it was observed that plasma perturbations in the acceleration channel are unstable in the presence of collisions. However, in most of the studies, the ion temperature has been neglected for the sake of simplicity. In our study, considering the thermal motions of the ions, we have found that an azimuthally propagating mode becomes unstable under certain conditions on the axial distribution of parameters inside the thruster channel. The effect of the temperature and magnetic field on the growth rate of the instability has been studied and it is observed that the growth rate increases for the higher ion temperature and stronger magnetic field.

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