

Resistive Instability in a Multi Ions Hall Thrusters Plasma

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Abstract : Hall thrusters are preferred over chemical thrusters because of its high exhaust velocity (around 10 times higher) and high specific impulse. The propellant Xenon is ionized inside the channel and controlled by the magnetic field. The strength of the magnetic field is such that only electrons get magnetized and ions remain unmagnetized because of larger Larmor radius as compared with the length of the channel of the device. There is quite a possibility of the existence of multi ions in a Hall thruster plasma because of dust contribution or another process which take place in the chamber. In this paper, we have derived the dispersion relation for multi ions resistive instability in a hall plasma. The analytical approach is also used to find out the propagating speed and the growth rate of the instability. In addition, some growing waves are also found to exist in the plasma. The dispersion relation is solved numerically to see the behavior of the instability with the plasma parameters viz, the temperature of plasma species, wave number, drift velocity, collision frequency, magnetic field.

Keywords : instability, resistive, thrusters, waves

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