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Effect of the Discharge Voltage on the Performance of the Hall Thruster PING DUAN, AN-NING CAO, GUANG-RUI LIU, XING-YU BIAN, YAN YIN, Dalian Maritime University, LONG CHEN, Dalian University of Technology — A two-dimensional physical model is established according to the discharging process in the Hall thruster discharge channel. By using particle-in-cell method, the influences of the discharge voltage on the distribution of the potential, ion number density, electron temperature and ion radial velocity are investigated in a fixed magnetic field configuration, and the reason of discharge current increasement along with discharge voltage is also analyzed. It is found that, while the discharge voltage increases during 250-650V, the distribution of electric potential has a small expansion towards anode in axis direction, the ion radial velocity at the exit is reduced, and collision frequency between ions and wall surface is also decreased. Meanwhile, the saturation of electron temperature is observed when discharge voltage is in the range of 400-450V, and the electron temperature decreases. When the discharge voltage increases to 700V, the distribution of potential expands towards anode in axis direction significantly, the acceleration region length is greatly increased, the ionization region is compressed to the vicinity of anode, the ion radial velocity near the wall increases and collision frequency between ions and wall surface is enhanced. As the increasement of near wall conductive current and high energy electron number inside the discharge channel, the discharge current increases monotonously with the increase of discharge voltage.

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