Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

The Influences of the Wall Material Arrangement of Ionization Region on the Discharge Characteristics of the Hall Thruster Channel[1]

PING DUAN, LONG CHEN, XINGYU BIAN, XIANG HU, WENQING LI, Dalian Maritime University — Hall thruster plasma has strong interactions with the channel wall, which significantly affect the discharge performance of the thruster. In this work, a two-dimensional physical model is established based on the discharge process of Hall thruster discharge channel. PIC method is applied to study the influences of segmented low emission graphite electrodes with biased voltage on discharge characteristics of the Hall thruster channel. The influences of segmented electrode arranged in the ionization region on electric potential, ion number density, electron temperature, ionization rate, discharge current and impulse are discussed. The results show that, when the segmented electrode is arranged at different positions in the ionization region, the axial length of the acceleration region is obviously shortened, the potential line is perpendicular to the wall, and the channel wall corrosion decreases along with the radial velocity reduction. As the position of the segmented electrode moves towards the acceleration region, the axial peak position of electron temperature moves towards the exit. The collision frequency between the electrons and the wall increases, the ionization rate is enhanced, the discharge current declines, eventually the impulse of thruster is improved.

[1]Project supported by the National Natural Science Foundation of China (Grant Nos. 11605021,11375039)

Ping Duan
Dalian Maritime University

Date submitted: 02 Jun 2017 Electronic form version 1.4