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EVALUATION OF THE PERFORMANCES OF A HELICON PLASMA THRUSTER

Abstract

A full-scale simulation code is developed to evaluate the performances of a helicon plasma thruster designed in NUDT. A global energy and particle balance model is employed to get the stable discharge parameters in the source tube which are then used as the inlet conditions of a two-dimensional axis-symmetric PIC code studying plasma expansion and acceleration processes along a diverging magnetic field. The PIC code assumes a Maxwell distribution of electrons. The fluid and PIC models together give a full description of the thrust performances such as thrust, specific impulse. The results show an appropriate agreement between simulation and experiments conducted in a vacuum chamber which shows the validity of the developed full-scale model.