

Abstract Submitted
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Two-dimensional Particle-in-cell model of a Hall effect thruster¹

PHILIPPE COCHE, LAURENT GARRIGUES, LAPLACE (LABORATOIRE PLASMA ET CONVERSION D'ENERGIE), CNRS AND UNIVERSITE DE TOULOUSE, FRANCE TEAM — Hall effect thruster is a type of space propulsion engine in which the thrust arises from the acceleration of ions by an electric field. One of its particularity is the use of a magnetic field whose purpose is to increase the ionization rate and create a high electric field zone where the ions are accelerated. The incoming electrons from the cathode drift through the magnetic barrier where ionization is greatly enhanced, toward the anode where the neutral propellant gas is injected. We present a two-dimensional particle-in-cell model of a Hall effect thruster, where a particle rezoning method is applied to decrease the computational time. In the region of low neutral density and high magnetic field magnitude, the classical theory predicts a cross-magnetic field mobility by two orders of magnitude lower than the measured one. The model is used to improve the understanding of the physics responsible of the so-called anomalous mobility through plasma turbulence.

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