

1D PIC simulation of electromagnetic field penetration into magnetized plasmas for electrodeless electric thrusters

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We perform one-dimensional particle-in-cell (PIC) simulation of external electromagnetic field penetration into magnetized plasmas for development of electrodeless electric thrusters. The externally applied electromagnetic field near ion cyclotron frequency is assumed for the ponderomotive acceleration/ion cyclotron resonance (PA/ICR) scheme. We consider two schemes for the electromagnetic field excitation: electrostatic excitation by electrodes and electromagnetic excitation by current antenna. For both schemes we will evaluate a degree of the electromagnetic field penetration and discuss an energy conversion rate of the external field into plasmas in the PA/ICR scheme.

Keywords: external electromagnetic field, electric field penetration, electrodeless electric thruster, plasma acceleration, ponderomotive force, PIC simulation