Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Study of Ion Beam Forming Process in Electric Thruster Using 3D FEM Simulation TAO HUANG, XIAOLIN JIN, QUAN HU, BIN LI, ZHONGHAI YANG, University of Electronic Science and Technology of China — There are two algorithms to simulate the process of ion beam forming in electric thruster. The one is electrostatic steady state algorithm. Firstly, an assumptive surface, which is enough far from the accelerator grids, launches the ion beam. Then the current density is calculated by theory formula. Secondly these particles are advanced one by one according to the equations of the motions of ions until they are out of the computational region. Thirdly, the electrostatic potential is recalculated and updated by solving Poisson Equation. At the end, the convergence is tested to determine whether the calculation should continue. The entire process will be repeated until the convergence is reached. Another one is time-depended PIC algorithm. In a global time step, we assumed that some new particles would be produced in the simulation domain and its distribution of position and velocity were certain. All of the particles that are still in the system will be advanced every local time steps. Typically, we set the local time step low enough so that the particle needs to be advanced about five times to move the distance of the edge of the element in which the particle is located.

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Date submitted: 24 Jul 2015 Electronic form version 1.4