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3D Electromagnetic Plasma Particle Simulations

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A 3D electromagnetic plasma particle-in-ccl] code has been developed using the General Concurrent PIC algorithm[1]. The GCPI C algorithm uscs a domain decomposition to divide the computation among the processors[1]. Particles must bc exchanged between processors as they move. The efficiences for 1-, 2-, and 3-dimensional partitions of the three dimensional domain are compared, and the algorithm is found to bc very efficient even when a large fraction (e.g. 30%) of the particles must bc exchanged at every time step.

This PIC code has been used to perform simulations of a variety of space plasma physics problems. Results of three applications will be discussed: 1)plasma disturbances induced by moving conducting bodies in a magnetized plasma; 2)plasma plume interactions; and 3)solar wind termination shock.

1. P.C. Liewer and V.]<. Decyk, J. Computational Physics, 85, 1989.