

Introduction

This suite of codes in the directory mpbeps2 contains three separate main codes which share many functions. The electrostatic code mpbeps2 is the most simple, keeping only the Coulomb interaction between particles, with two position and two velocity components for the particles. The electromagnetic code mbbeps2 keeps the electric and magnetic fields described by the full set of Maxwell's equations, with two position and three velocity components for the particles. The Darwin code mdbeps2 keeps the electric and magnetic fields generated by particles (omitting light waves) described by the Darwin subset of Maxwell's equation where the transverse displacement current is omitted, with two position and three velocity components for the particles. The Darwin code can also be run as an electrostatic code by setting the speed of light to infinity. All codes can be run with relativistic equations of motion. The particle calculations are performed in parallel using OpenMP and MPI. If MPI is not available, the codes can be compiled with OpenMP only. Parameters to set various parameters in the code, described below, are described at the beginning of the files mpbeps2.f90, mpbbeps2.f90, and mpdbeps2.f90. All codes currently use periodic boundary conditions.

Initializations

The plasma density can be initialized with a uniform density profile. The initial velocity distributions are Maxwellian for non-relativistic particles or Maxwell-Juttner momentum distributions for relativistic particles. Both electrons and one species of ions are supported, and two populations of each species are possible (a background and a beam population).

Diagnostics

The only diagnostic currently implemented is energy.

Future Plans

Namelist input, various initial density profiles, external forces, field and particle diagnostics, restart and reset capabilities.