Three Dimension Particle-in-Cell Simulation of Mercury's Magnetosphere

Giovanni Lapenta, David Schriver, Raymond J. Waker, Jean Berchem, Nicole F. Echtering, Mostafa El-Alaoui

This file contains the output from the implicit particle-in-cell (PIC) of Mercury's magnetosphere. The format is hdf5 (h5). The simulation results are from Lapenta et al. 2022 (citation goes here when we get it). There are five folders giving the results for five times, cycles 1, 400, 700, 1000, 1600. Cycle 1 gives the initial state of the simulation and cycle 1600 gives the final state. Cycle 1600 corresponds to 3.8s in real time. The arrays are 201x201x161 where Z is fastest, then Y and X is slowest. The physical domain is 9.6x12x12 RH (Mercury radii with X along the Sun-Mercury line, Y is east-west, and Z is north-south). For particles 0 gives electron values and 1 gives ion values.

The files in each folder are given with the notation below where the last 6 digits give the cycle number.

The files containing results are:

/Step#0/Block/Bx/0 (201 x 201 x 161) : Mercury-Fields_001600 (Bx magnetic field component)

/Step#0/Block/By/0 (201 x 201 x 161) : Mercury-Fields_001600 (By magnetic field component)

/Step#0/Block/Bz/0 (201 x 201 x 161) : Mercury-Fields_001600 (Bz magnetic field component)

/Step#0/Block/EFx_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux x-component electrons)

/Step#0/Block/EFy_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux x-component ions)

/Step#0/Block/EFy_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux y-component electrons)

/Step#0/Block/EFy_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux y-component ions)

/Step#0/Block/EFz_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux z-component electrons)

/Step#0/Block/EFz_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (energy flux z-component ions)

/Step#0/Block/Ex/0 (201 x 201 x 161) : Mercury-Fields_001600 (electric field x-component)

/Step#0/Block/Ey/0 (201 x 201 x 161) : Mercury-Fields_001600 (electric field y-component)

/Step#0/Block/Ez/0 (201 x 201 x 161) : Mercury-Fields_001600 (electric field z-component)

/Step#0/Block/Jx_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density x-component–electrons)

/Step#0/Block/Jx_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density x-component ions)

/Step#0/Block/Jy_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density y-component – electrons)

/Step#0/Block/Jy_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density y-component – ions)

/Step#0/Block/Jz_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density z-component – electrons)

/Step#0/Block/Jz_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (current density z-component – ions)

/Step#0/Block/N_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (density- electrons)

/Step#0/Block/N_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (density-ions)

/Step#0/Block/Pxx_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pxx - electrons)

/Step#0/Block/Pxx_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pxx - ions)

/Step#0/Block/Pxy_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pxy – electrons)

/Step#0/Block/Pxy_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pxy – ions)

/Step#0/Block/Pyz_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pyz – electrons)

/Step#0/Block/Pyz_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pyz – ions)

/Step#0/Block/Pzz_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pzz – electrons)

/Step#0/Block/Pzz_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (pressure tensor component Pzz – ions)

/Step#0/Block/divB/0 (201 x 201 x 161) : Mercury-Fields_001600 (div B)

/Step#0/Block/divE/0 (201 x 201 x 161) : Mercury-Fields_001600 (div E)

/Step#0/Block/rho_0/0 (201 x 201 x 161) : Mercury-Fields_001600 (charge density – electrons)?

/Step#0/Block/rho_1/0 (201 x 201 x 161) : Mercury-Fields_001600 (charge density – ions)?