

R008-03

Zoom meeting D : 11/3 AM1 (9:00-10:30)

09:45-10:00

Performance measurements of the particle-in-cell code with adaptive load balancing

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In the last meeting at JpGU, we reported current status of development of our particle-in-cell simulation code: We successfully implemented the recursive multi-section algorithm, which have been used in the cosmological N-body simulations (Makino, 2004; Ishiyama et al., 2009), into the PIC simulation code. Benchmark tests of the Weibel instability showed that this technique is capable of maintaining the workload balance in a controllable way. In addition, it also adapts to the moving injector boundary which is a standard technique for examining collision-less shock simulations. Having these successful early results, we are examining its parallel efficiency with larger numbers of MPI processes. Associated data copies and rather complex inter-process data transfers introduce additional costs which in turn hamper efficient parallel scaling. We need to optimize the MPI transfer algorithm and the frequency of triggering this adaptive balancing. In this presentation, we report detailed algorithms of the MPI transfer for this technique and results from performance measurements on supercomputer systems including Fugaku.