Development of Manycore-Aware PIC Simulator with OhHelp and Particle Binning Method

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This paper discusses manycore-aware implementation of plasma particle-in-cell simulation code parallelized with the OhHelp and particle binning techniques. As a step of the development, we implemented its prototype to confirm the effectiveness and efficiency of our manycore-aware techniques such as cell coloring, on-the-fly particle sorting, and position-aware inter-process particle transfer. In this report we summarize these issues and then present results of fundamental performance evaluation with various artificial/physical settings including those causing severe load imbalance among processes.

Keywords: Particle-in-cell simulation, Manycore processor, Domain decomposition, Dynamics load balancing, Particle binning