Development of simulation code connecting particle-in-cell and magnetohydrodynamics on hierarchical mesh

T. Ogawa, S. Usami\textsuperscript{a}, R. Horiuchi\textsuperscript{a}, M. Den\textsuperscript{b}, K. Yamashita\textsuperscript{c}

\textit{Kitasato University, Sagamihara 252-0373, Japan}
\textsuperscript{a} \textit{National Institute for Fusion Science, Toki 509-5292, Japan}
\textsuperscript{b} \textit{National Institute of Information and Communications Technology, Koganei 184-8795, Japan}
\textsuperscript{c} \textit{University of Yamanashi, Kofu 400-8510, Japan}

ogawa@kitasato-u.ac.jp

We develop a simulation code for multi-hierarchical phenomena. The simulation domain is divided to a Particle-in-Cell (PIC) domain and a magnetohydrodynamics (MHD) domain [1]. The MHD domain has a regular-intervals mesh in the center region and a hierarchical mesh in the peripheral region, and the latter is managed by Adaptive Mesh Refinement (AMR) method [2]. It is able to extend the MHD domain outward with low computational costs. This approach makes it possible to treat microscopic physics and macroscale structure simultaneously. Test models are implemented and computational costs in memory and CPU time are estimated.

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Schematic diagram represents a divided simulation domain and meshes.