

# Proposal of a multi-scale simulation system on parallel computer

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Multi-scale interactions are crucial for understanding dynamics in a variety of plasma phenomena in the Earth magnetosphere. We herein propose a macro-micro scale simulation method working on parallel super-computers. This method provides us with a simulation environment where two simulation codes are combined; a hybrid code and a full particle code(KEMPO).

In the first step, we perform parallelized 3D hybrid simulation using MPI on a parallel computer. Next, a set of KEMPO 1D codes are executed with initial parameters at several regions in the first step simulation, where micro-scale plasma phenomena are thought to be crucial.

We constructed a multi-scale simulation system to study the macro-micro scale phenomena self-consistently. In this paper, we perform simulations of magnetotail reconnection phenomena using multi-scale simulation and visualize the data on a 3-D visualization tool. Our design of future system combining parallel macro/meso/micro scale simulations, network database system, and 3D virtual reality visualization is also discussed.