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Toward New Phase of Collisionless Driven Reconnection Studies with Multi-Hierarchy Simulation SHUNSUKE USAMI, HIROAKI OHTANI, RITOKU HORIUCHI, National Institute for Fusion Science, MITSUE DEN, National Institute of Information and Communications Technology — For comprehension of magnetic reconnection as a multi-hierarchy phenomenon, we have developed a multi-hierarchy simulation model which solves macroscopic and microscopic physics simultaneously and self-consistently. In our multi-hierarchy model, the simulation domain is divided into macro- and micro-hierarchies. The physics in the macro-hierarchy is calculated by the MHD algorithm, and the dynamics in the micro-hierarchy is expressed by the PIC algorithm. Between two hierarchies, the interface domain is inserted, where physical quantities in the macro- and micro-hierarchies are exchanged. In 2009, using the multi-hierarchy model with periodic condition in the downstream direction, we succeeded in the demonstration of multi-hierarchy simulation of magnetic reconnection. We confirmed that reconnection found in our model exhibit true physics, by comparing it with pure PIC simulation results. Recently we have improved our multi-hierarchy model where open boundary condition is applied in the downstream direction. Reconnection is driven in the same way as the first model. Furthermore, we are creating a model that calculation algorithm is automatically converted from MHD to PIC, vice versa, as reconnection system evolves dynamically.

Shunsuke Usami
National Institute for Fusion Science

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