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Magnetic islands and energy conversion process in collisionless driven reconnection RITOKU HORIUCHI, SHUNSUKE USAMI, HIROAKI OHTANI, National Institute for Fusion Science — Relationship between magnetic islands and energy conversion process in collisionless driven reconnection is investigated by means of electromagnetic particle simulation in an open system. By controlling an external driving field imposed at the upstream boundary, we realized two different kinds of solutions in the time evolution of a reconnection system starting from the same initial condition, i.e., the first is a solution with no magnetic islands in the current sheet, and the second is a solution with many islands in it. The energy conversion rate in the second solution is found to be much higher than that in the first solution. This suggests that magnetic islands play a key role in the energy conversion process of collisionless reconnection. The energy conversion rate from the EM field to plasmas decreases as a guide field is intensified. However, its rate to ions is always twice of that to electrons, regardless of whether a guide magnetic field and/or magnetic islands exist It is also found that the energy conversion from the EM field to ions is dominantly caused by the in-plane electric field, while the conversion to electrons is by the out-of-plane electric field.

Ritoku Horiuchi
National Institute for Fusion Science

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