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How ions gain energy in driven magnetic reconnection? C.Z. CHENG, University of Tokyo, SHIZUO INOUE, Japan Atomic Energy Agency, YASUSHI ONO, University of Tokyo, RITOKU HORIUCHI, National Institute of Fusion Science — We report physical understanding of how ions move across the reconnection current layer and the separatrix regions into the downstream and how they are accelerated/heated by the inductive and electrostatic electric fields during driven anti-parallel magnetic reconnection in collisionless plasmas. Because the ion gyroradii are comparable to or larger than the electrostatic electric field spatial localization width and the magnetic field scale length in these regions, the ion dynamics decouples from the electron dynamics. Based on the full ion orbit dynamics under the influence of the inductive and electrostatic electric fields, which have both perpendicular and parallel electric field components, we explain how the ion velocity distribution changes and how ions flow through the reconnection current layer and across the separatrix into the downstream. We find that ions gain energy mainly from the inductive electric field and less from the electrostatic electric field.

Chio Cheng
Univerity of Tokyo

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