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Impulsive magnetic reconnection induced by electromagnetic fluctuations during guide field magnetic reconnection experiment AKIHIRO KUWAHATA, RYOMA YANAI, MICHIAKI INOMOTO, HIROSHI TANABE, YASUSHI ONO, The University of Tokyo — Impulsive reconnection was observed subsequently to the occurrence of large-amplitude monochromatic electromagnetic fluctuations, which were generated inside the diffusion region during magnetic reconnection in the presence of a guide field ($B_g/B_r > 1$, where B_g and B_r are the guide field and reconnection field, respectively), in TS-3 plasma merging experiment. The fluctuations satisfy the dispersion relations of kinetic Alfvén wave (KAW). We found a positive correlation between the amplitude of fluctuations and the enhancement of reconnection rate. Ion heating was also observed after the waves propagated to the downstream region, but the wave's Poynting flux was not large enough to balance with the observed ion heating power. The integrated scenario in guide field reconnection for impulsive fast reconnection is: (1) energetic electrons are produced by parallel acceleration during initial slow reconnection phase, (2) the fast electrons drive instabilities to excite KAW-like fluctuations inside the diffusion region, and then (3) these waves modify the local current sheet structure to trigger the impulsive fast reconnection. Although the waves do not account for the energy gain itself, they play roles to rapidly release magnetic energy.

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