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Impulsive Magnetic Reconnection by Acceleration of Ejecting Plasmoid Motion Y. ONO, C.Z. CHENG, Y. HAYASHI, A. KUWAHATA, H. TANABE, K. KADOWAKI, University of Tokyo — We show for the first time in laboratory merging experiments, the ejection of plasmoid from current sheet as a major driving mechanism for impulsively fast magnetic reconnection. The high inflow of plasma (and thus magnetic flux) and low current-sheet resistivity cause flux pile-up initially, which is followed by rapid growth of plasmoid in the current sheet. When the flux pileup exceeds a critical level, the plasmoid is ejected from the squeezed current sheet area. The reconnection rate is slow during the flux pileup stage, but becomes drastically fast during the ejection, indicating impulsive reconnection. The reconnection electric field and effective resistivity in the current sheet reach their peak values when the acceleration rate of plasmoid motion peaks. This clear relationship indicates that the acceleration of plasamoid ejection is a major fast reconnection mechanism. The present experimental result explains the simultaneous occurrence of plasmoid acceleration rate and enhanced magnetic reconnection observed during the impulsive phase of solar flares.

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