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EUV burst, particle heating and whistler wave emission in fast magnetic reconnection induced by kink-driven Rayleigh-Taylor instability XIANG ZHAI, KIL-BYOUNG CHAI, PAUL BELLAN, California Institute of Technology, BELLAN PLASMA GROUP TEAM — Fast magnetic reconnection associated with a Rayleigh-Taylor instability in a kinked flux rope is studied in the Caltech jet experiment. As the kinked plasma accelerates laterally away from its equilibrium position, an effective gravity due to the acceleration results in a secondary Rayleigh-Taylor instability. This Rayleigh-Taylor instability erodes the plasma to a scale smaller than the ion skin depth and induces a fast magnetic reconnection. A spatially localized energetic EUV burst is observed at the position of fast magnetic reconnection, indicating strong localized electron heating. A circularly polarized high frequency magnetic field perturbation is simultaneously observed at some distance from the reconnection region indicating that the reconnection emits whistler waves and that Hall dynamics governs the reconnection. Spectroscopic measurement including Stark broadening and Doppler broadening shows simultaneous fast ion heating. It is also observed that the voltage across the source electrodes spikes when there is fast magnetic reconnection resulting from the fact that magnetic reconnection changes the magnetic flux linking the electrode circuit. The electron heating is consistent with Ohmic dissipation while the ion heating is consistent with stochastic heating.

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