

Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Satellite observations of plasma waves in the reconnection regions¹ CHIJE XIAO, XIAOGANG WANG, HAOMING LIANG, School of Physics, Peking University, Beijing 100871, ZUYIN PU, Dept. of Geophysics, Peking University, — The waves and related anomalous resistivities for fast magnetic reconnection are long-standing problems for decades. Some kinds of plasma waves are suggested to response to via wave-particles interactions are suggested. We here report several reconnection events observed by Cluster spacecraft in the plasma sheet. First the inflow regions, null-null lines and outflow regions are clear identified via Poincare index calculating, as well as the magnetic fields and plasma properties. Then using the SVD and k-filtering methods, the Alfvén waves, whistler waves, and lower-hybrid (LH) waves are identified in the different parts of reconnection regions: such as the exhaust region, the ion diffusion region, and the electron diffusion region near the x-point. The wave vectors, ellipticities, and polarizations, and the power spectrum of these modes are also quantitatively analyzed. Furthermore, the anomalous resistivities due to wave-particle interactions of those modes are also calculated, and in comparison with the effective resistivity calculated from electrical field and current data. It is found that, the anomalous resistivity induced by LH waves near the x-point may be sufficient to trigger fast reconnection.

¹Supported by NSFC (No.40974104) and RFDP (No.20090001110012)

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Date submitted: 13 Jul 2011

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