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Adiabatic Phase Mixing and Fast Electron Heating in Thin current Sheet[1] HAIHONG CHE, NASA/GSFC, JAMES DRAKE, MARC SWISDAK, University of Maryland, MELVYN GOLDSTEIN, NASA/GSFC — Using particle-in-cell simulations and kinetic theory, it's found that strong Buneman instability develop non-linearly in thin current layer form in plasma with $\Omega_e/\omega_{pe} < 1$. The Buneman instability produces strong electric field and fast phase mixing which leads to the increase of electron temperature by more than a factor of 10 in a few tens of electron gyro-periods. The resonance of wave-particles feeds waves with particle's kinetic energy and causes the growth of waves and strong trapping of electrons in a large velocity range. We discovered it is the adiabatic movement of trapped electrons produce fast phase mixing when the particle's bounce rate is much larger than the growth and decay rate of waves. The adiabatic movement effectively exchange energy between particles and waves and redistribute the energy from high velocity electrons to low energy electrons with the assistance of the non-adiabatic crossing of separatrix of electron holes. The implications of the results for reconnection are being explored.

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