



Thin current sheet dynamics and bulk plasma parameters

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We discuss observations that are intimately tied to thin current sheets during substorms. Numerous publications of large bulk plasma velocities have been interpreted as resulting from a neutral line formation. However, we will demonstrate that using only bulk parameters to characterize thin current sheets can lead to misleading conclusions, especially when the current sheet is thin, \sim ion gyro-radius. This is due to the fact that in thin current sheets, spacecraft particle instruments measuring energies below a few tens of keV discern the effects of remote sensing of the boundary, resulting in measured distributions that have large gradients in the phase space that are non-gyrotropic. Velocity moments computed from non-gyrotropic distributions yield very large velocity moments even though the plasma has small drifts. Studying the physics of thin current sheet dynamics requires examination of full particle distributions.