



Electron populations in thin current sheets close to and during substorms

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During the growth phase and at the triggering of substorms, the current sheet in the equatorial magnetotail can become very thin. At about 20 terrestrial radii, Cluster crossed such thin current sheets with thicknesses estimated to be of the order of one to a few ion gyroradii. The plasma sheet activity regarding the magnetic field fluctuations and the wave activity seems to depend on the scale of this thickness. In the mean time, Cluster observes different particle behaviours in addition to the expected keV plasmashet ions and electrons. In some cases, fast ion flow bursts are detected as already reported by other observations at substorms onset. In other cases, during the growth phase, Cluster may observe field-aligned low-energy electrons over limited spatial extensions. All these particles contribute to currents. The total current, estimated from the magnetic field fluctuations, put forward different scales and different current carriers. The objective of this study consists to compute the currents carried by the different populations, to identify the dominant current carrier and try to infer their different scales by comparison to the current sheet thickness.