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In situ observations of ion scale current sheet and associated electron heating in Earth's magnetosheath turbulence

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Magnetic reconnection occurs in thin current sheets that form in turbulent plasmas. Numerical simulations indicate that turbulent reconnection contributes to the dissipation of magnetic field energy and results in particle heating and non-thermal acceleration. Yet in situ measurements are required to determine its importance as a dissipation mechanism at those scales. The Earth's magnetosheath downstream of the quasi-parallel shock is a turbulent near-Earth environment that offers a privileged environment for such a study. Here we present a study of the properties of thin current sheets by using Cluster data. We studied the distribution of the current sheets as a function of their magnetic shear angle, the PVI index and the electron heating. The properties of the observed current sheets were different for high shear ($\theta > 90$ degrees) and low shear current sheets ($\theta < 90$ degrees). These high-shear current sheets account for about $\sim$ 20% of the total and have an average thickness comparable to the ion inertial length. Enhancement of electron temperature within these current sheets suggest that they are important for local electron heating and energy dissipation.