



Current flow in the terrestrial bow shock and magnetosheath: A Statistical Survey using Cluster Observations

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The Cluster spacecraft provide unique 3-D measurements of the magnetic field within the Earth's magnetosheath. Applying the Curlometer analysis method to the observed spatial gradients of the magnetic field leads to an estimation of current densities and directions based on Ampere's law. We carry out a statistical investigation of the structure of current flow in the bow shock, the magnetosheath and the adjacent dayside magnetosphere. To represent the electric current distribution within the magnetosheath we introduce a new bow shock-magnetosheath-normalized coordinate system. The BMN system allows us to map current distributions for various activity levels of the magnetospheric system. The global current structures are compared with theoretical considerations.