

Preliminary study of energetic particles embedded in magnetic structures observed in the near Earth plasmashheet

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Energetic ions embedded in plasmoids with By bipolar have been observed near the Earth when the IMF has a strong By component during a substorm active time period on Nov. 8, 2004. In the earthward flowing plasmoid that is observed before the substorm onset, the ratio of heavy ions to protons is lower than that in its environment, while for the tailward plasmoids, the ratio is always higher in the magnetic structures. This is consistent with the distribution of heavy ions in the plasmashheet obtained by a statistic study based on plasma sheet crossing events. It is found that in the earthward flowing plasmoid, oxygen ions are relatively cold with a higher kinetic pressure than thermal pressure inside the structure. It is therefore suggested that oxygen ions in the tailward flowing plasmoid might be heated in the near earth current sheet. Energetic electrons are found being trapped in the plasmoid with a strong core field, demonstrating its good character as an indicator for magnetic structures with closed field lines. A multiple x-line reconnection could be employed to explain the observed results.