



Discontinuities in the ion dispersions observed by Cluster using multi-point measurements in the polar cusp

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The polar cusps are two regions of the magnetosphere where the influence of the interplanetary magnetic field (IMF) is particularly strong. When the IMF is southward the plasma enters the cusp around the subsolar point or near the equatorward boundary of the cusp. On the other hand, when the IMF is northward, the plasma enters through the lobes or the poleward boundary of the cusp. Subsequently the ions precipitating in the cusp are dispersed poleward when the IMF is southward and equatorward when the IMF is northward. This dispersion is caused by the motion of field lines driven by the magnetic tension away from the reconnection point. If reconnection is continuous and operates at constant rate, the ion dispersion is smooth and continuous. On the other hand if the reconnection rate varies, we expect interruption in the dispersion forming energy steps or staircases. On 23 September 2004, the 4 Cluster spacecraft crossed the mid-altitude polar cusp within 1-16 minute from each other. The first two spacecraft, separated by about 1min 20s observed a typical Bz-South ion dispersion, where the energy of the ions decreases as latitude increases. The dispersions were not smooth but presented discontinuities that were the same on the two spacecraft. We will compare these dispersions and investigate the possible causes of their similarity. Other examples of cusp crossings with different time delays between the spacecraft will be analysed to investigate the origin of the discontinuities.