



## Magnetosheath Cavities in Hybrid Simulations

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While traversing the magnetosheath, the Cluster spacecraft observed low magnetic field strength and density regions. We showed that these magnetically depressed regions are associated with increases in the energetic particle flux. These depressed magnetic field regions resemble the foreshock cavities upstream from the bow shock in that the suprathermal ions reflected from the bow shock caused depressed magnetic fields diamagnetically. Statistical analysis of about 180 magnetosheath cavities associated with high flux bursts of energetic particles (FBEs) showed that the cavities and their associated flux bursts are seen mostly during quasi parallel shock and when the IMF lies in the equatorial plane. The hybrid simulations of solar wind magnetosphere coupling show that the cavities form during radial IMF. Simulations also show that while the magnetic field and density decreases within the cavity regions, the temperature increases in agreement with the Cluster magnetosheath cavities. Similar to the observations, simulations also indicate highly fluctuating fields within the magnetosheath cavities. In the simulations, depressed field regions are found more around the subsolar and the complexity of the magnetosheath cavity structures increases as one moves towards flanks which are seen to be associated with the high wave activity and need to be studied further in detail. We will compare the simulation results with the results from the Cluster observations in order to gain insight on the structure and occurrence of magnetosheath cavities.