

Outflow jets from lobe reconnection and their relationship to shear flow

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One of the key parameters of magnetic reconnection is shear flow which is parallel to the reconnecting field. Some simulation studies and theoretical predictions have suggested that the reconnection rate and the outflow jet speed can be reduced as shear flow increases. On the other hand, others report that the reconnection rate is not necessarily affected by the existence of shear flow. Further studies need to be done to understand how shear flow affects the reconnection process. For northward IMF, reconnection can occur at high latitudes of the Earth's magnetopause, where the magnetosheath flow in the tailward direction acts as shear flow. In this study, we took the lobe reconnection events from the observation by the Cluster satellites and examined the relationships of the ion outflow jet to the magnetosheath tailward flow. The result from the analysis has shown that there is a tendency for the ion outflow jet to increase as the speed of the magnetosheath flow tangential to the magnetopause current sheet increases. This indicates that ions are more greatly accelerated through the lobe reconnection as shear flow increases. We will discuss this tendency in terms of the turbulent structure of the Hall electric field in the ion diffusion region, which is caused by the complicated ion distribution consisting of the tailward magnetosheath flow and the earthward outflow jet.

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