[JJ] Evening Poster | P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM19]Heliosphere and Interplanetary Space

convener:Ken Tsubouchi(Tokyo Institute of Technology), Masaki N Nishino(Institute for Space-Earth Environmental Research, Nagoya University), Yasuhiro Nariyuki(富山大学人間発達科学部)
Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
This session aims to secure comprehensive insights into physical processes of plasmas and fields in the heliosphere. Presentations of the recent studies from any approaches (integrated observation/theoretical modeling/massive numerical simulation) are welcomed. Topics are not restricted to any specific issues: phenomenological studies on solar flares/CME/solar wind, and related fundamental physics problems such as shocks/waves/turbulence/particle transport and acceleration can be the main target, including heliospheric high-energy phenomena and their impact on the Earth's environment.

[PEM19-P05]Dependence of the collisionless shock jump conditions on downstream parameters

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Keywords:collisionless shock, shock jump conditions, in-situ observations, Bow Shock

Shock acceleration is considered as a cause of high-energy cosmic rays. It is important to understand the structure of collisionless shocks and the behavior of plasma.
In this study, in order to understand the large scale structure of collisionless shocks in detail, we compare between in-situ observations of the Earth’ s bow shock and the MHD shock theory with temperature anisotropy taken into account [Kalimabadi et al., 1995]. We use data obtained from a particle detector, FPI (Fast Plasma Instrument) on board the MMS spacecraft to determine upstream and downstream physical quantities in de Hoffmann Teller Frame which is one of the shock rest frames. The shock normal is estimated with the Minimum Variance Analysis. Downstream parameters are also determined theoretically from the MHD shock jump conditions, using upstream parameters and the shock normal estimated from the MMS observations. We use observed temperature anisotropies for both cases. We then use the Alfvén Mach number for comparison.
We analyzed data for five bow shock crossings in October 2017. For all events, the difference in downstream Aflvén Mach number between observations and theory is larger than observational errors. We discuss the importance of downstream temperature anisotropy in the shock jump conditions. We also investigate the relative significance of possibly effective downstream parameters: heat flux due to shock-accelerated particles and energetic particles escaping from the magnetosphere, and magnetic field pressure originating from downstream turbulence.