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Modeling soft X-ray emissions at the dayside magnetopause

Qiuyu Xu¹, Dimitra Koutroumpa¹, Ronan Modolo¹, Tianran Sun², Hyunju Connor³, and Steve Sembay⁴

¹LATMOS/IPSL, CNRS, UVSQ Université Paris-Saclay, Sorbonne Université, Guynacourt, France

²National Space Science Center, Chinese Academy of Sciences, Beijing, China

³NASA Goddard Space Flight Center, Greenbelt, MD, USA

⁴Leicester University, Leicester, UK

In this study, we simulate the Solar Wind Charge Exchange (SWCX) soft X-ray emissions at dayside magnetopause by using magnetohydrodynamic (MHD) and Test-Particle (TP) models. Due to the single fluid description, the MHD model is unable to resolve the particle kinetic effects or distinguish the magnetospheric plasma and the solar wind plasma. We investigate these effects with the TP model. As the TP model does not self-compute magnetic and electric field, the magnetic and electric field data obtained from OpenGGCM and PPMLR MHD model are used as the input to TP model. The soft X-ray emissivity maps simulated from pure OpenGGCM and PPMLR MHD approaches and from TP-OpenGGCM and TP-PPMLR MHD approaches are presented and compared. The results indicate that the TP model can well resolve the kinetic effects and the individual spectral characteristics, and it does not require a masking method in the magnetosphere. Therefore the TP model is a complementary approach for simulating the X-ray emissions in the dayside magnetosheath and cusps.