



MHD Coupling with PIC to Study the Magnetic Reconnection Process in the Martian Plasma Tail

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Mars Atmosphere and Volatile Evolution Mission (MAVEN) observations showed clear evidence that magnetic reconnection happens in the Martian plasma tail. We use both the HALL MHD model and the two-way coupled MHD-PIC model to study a MAVEN magnetotail reconnection event based on the observed solar wind conditions to understand the reconnection process and quantify its global consequences. The coupled approach takes advantage of both MHD and PIC models, making it feasible to conduct kinetic simulations under realistic solar wind conditions. Model results show that the Martian magnetotail is highly dynamic and the Marsward plasma flow velocities due to magnetic reconnection are higher for the lighter ion fluid, which are quantitatively consistent with MAVEN observations. The effect of the magnetic reconnection on the total ion loss rate will also be discussed based on model results.