Abstract Submitted
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Magnetic reconnection and turbulence: What we learn from the MMS mission and PIC simulations[1] LI-JEN CHEN, NASA Goddard Space Flight Center, SHAN WANG, JONATHAN NG, NAOKI BESSHO, NASA Goddard Space Flight Center/University of Maryland, THE MMS TEAM — The unprecedented high resolution measurements from NASAs Magnetospheric Multiscale (MMS) mission uncover a never-before-seen connection between new turbulence and reconnection regimes. For the first time, lower hybrid drift turbulence is observed in the electron-scale reconnection layer, driving nongyrotropic electron heating. The perpendicular heating occurs within lower hybrid drift vortices and may lead to locally enhanced tearing growth, triggering further reconnection on scales between the electron and ion inertial lengths. At the terrestrial bow shock and its downstream, the intense current structures generated by the shock turbulence are prone to reconnection. As indicated by measurements from the MMS mission and PIC simulations, electron-scale turbulence gives rise to reconnection without ion dynamics, while the typical reconnection with both electron and ion participation occurs in ion-scale turbulence. We will discuss how these MMS discoveries conceptually change the existing picture about reconnection and turbulence, and inspire a new frontier of research for both simulations and laboratory experiments.
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