Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Overview of waves in the Magnetic Reconnection Experiment: comparison to space observations JONGSOO YOO, Princeton Plasma Physics Laboratory, HANTAO JI, Princeton University, JONATHAN JARA-ALMONTE, SAYAK BOSE, AARON GOODMAN, ANDREW ALT, MASAAKI YAMADA, WILL FOX, Princeton Plasma Physics Laboratory — In the Magnetic Reconnection Experiment (MRX), there have been observations of various waves such as the quasi-electrostatic lower hybrid drift wave (ES-LHDW), electromagnetic lower hybrid drift wave (EM-LHDW), and whistler wave. Here we provide an overview of these measurements in comparison to space observations. During antiparallel asymmetric reconnection, the whistler wave is observed near the low-density side separatrix together with lower hybrid drift instabilities. This whistler wave is driven by temperature anisotropy of energetic electrons, while the instabilities are caused by multiple, fast-growing ES-LHDW modes, which are driven by density gradients. ES-LHDW becomes stable in the electron diffusion region (EDR) without a guide field due to the stabilization effects of the high plasma beta. EM-LHDW, on the other hand, exists in the EDR but the role of EM-LHDW in fast reconnection is found to be limited. Recently, ES-LHDW has been observed near the electron diffusion region with a significant guide field that lowers the local plasma beta. To explain the excitation of LHDW, a local linear model has been developed. This model explains both space and laboratory observations and provides a theoretical framework for wave-associated anomalous resistivity and electron heating.

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Date submitted: 04 Aug 2020 Electronic form version 1.4