Abstract Submitted
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Experimental demonstration of the role of electron pressure in fast magnetic reconnection with a guide field[1] W. FOX, PPPL, F. SCIORTINO, MIT, A. VON STECHOW, IPP Greifswald, J. JARA-ALMONTE, J. YOO, H. JI, M. YAMADA, PPPL — We report detailed laboratory observations of the structure of reconnection current sheets in a two-fluid plasma regime with a guide magnetic field, conducted on the Magnetic Reconnection Experiment. We observe in the laboratory for the first time the quadrupolar electron pressure variation in the ion-diffusion region, as originally predicted by extended MHD simulation. We quantitatively analyze the parallel and perpendicular force balance, and observe the projection of the electron pressure gradient parallel to the B field balances the parallel electric field. The resulting cross-field electron jets in the reconnection layer are diamagnetic in origin. Electron density variations are observed to dominate temperature variations and may provide a new diagnostic of reconnection with finite guide field for fusion experiments and spacecraft missions.

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