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Recent Advances in Fully Kinetic Simulations of Driven Magnetic Reconnection with Boundary Conditions Relevant to MRX V. ROYTERSHTEYN, W. DAUGHTON, L. YIN, B.J. ALBRIGHT, LANL, K.J. BOWERS, LANL and D.E. Shaw Research, LLC, S. DORFMAN, H. JI, M. YAMADA, PPPL — We present an overview of the recent kinetic simulations of driven magnetic reconnection with boundary conditions relevant to the Magnetic Reconnection eXperiment (MRX). In this effort, unique for reconnection studies, the data from a well-diagnosed dedicated reconnection experiment and state-of-the-art fully kinetic simulations are combined and used to guide both the simulation and the experimental campaigns[1]. The simulations are performed using the high-performance particle-in-cell code VPIC[2]. The Coulomb collisions are treated in VPIC using a well-known Monte-Carlo technique[3] that models a full collision operator. This approach allowed us to systematically examine the influence of weak Coulomb collisions on the dynamical evolution and structure of the reconnection layer. Initial results of 3D simulations that allow current-aligned instabilities to develop are presented, and the possible role of these instabilities in the reconnection dynamics is discussed. [1] Ji *et al. GRL*, 35, L13106 (2008) and Dorfman *et al.*, *Phys. Plasmas* **15**, 102107 (2008) [2] K. J. Bowers *et al.* Phys. Plasmas, v. **15**, p. 055703, 2008. [3] T. Takizuka and H. Abe, J. Comput. Phys., v. **25**, p. 205, 1977

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