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Magnetic Reconnection Driven by the Nernst Effect CHANG LIU, W. FOX, A. BHATTACHARJEE, Princeton Plasma Physics Laboratory, A. JOGLEKAR, A. THOMAS, University of Michigan, Ann Arbor — Magnetic reconnection in high-energy-density plasmas has been the subject of recent observations and PIC simulations. In laser-plasma experiments, laser-driven hot spots on a target can give rise to strong magnetic fields due to the Biermann battery effect. The hot spots can also produce strong heat flux perpendicular to the magnetic field, bringing into play the Nernst effect. Recently, using the Vlasov-Fokker-Planck code IMPACTA, which relies on a perturbative expansion of the electron distribution function holding ions fixed, Joglekar and Thomas (JT) have shown that the Nernst effect can play a significant role in magnetic reconnection. Since the domain of applicability of the expansion constrains the realm of validity of JT's results, we have undertaken a 2D PIC study of the Nernst effect, including complete kinetic dynamics of electrons as well as ions. We analyze the results using a broad range of dimensionless parameters, including plasma beta, the mass ratio of electrons and ions, and the Lundquist and Nernst numbers. We have found that the Nernst term contributes dominantly to support the the out-of-plane electric field upstream of the reconnection layer, consistent with JT's results. Variations on these results as a function of plasma parameters will be discussed.

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