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Electrostatic Microinstabilities within the Electron Diffusion Layer[1] J. JARA-ALMONTE, Princeton Plasma Physics Lab, W. DAUGHTON, Los Alamos National Laboratory, H. JI, M. YAMADA, Princeton Plasma Physics Laboratory — Both numerical simulations and laboratory experiments have extensively studied the electron skin-depth scale structure of the electron diffusion layer, but neither have fully resolved both the scale-seperation and physics on scales between the Debye length and the skin-depth. Here, the first fully kinetic 2D simulations of anti-parallel magnetic reconnection at realistic electron temperatures ($c/v_{the} = 64$ and $\omega_{pe}/\Omega_e = 32$) are presented. Macroscopic features such as the reconnection rate or layer width are found to be insensitive to the electron temperature. When the electron temperature becomes sufficiently low, the electron diffusion layer becomes unstable to electrostatic instabilities involving multiple streaming populations near the X-line. This leads to multiple electron holes within the electron diffusion layer which interact non-linearly to generate turbulence which may be important in understanding the electron heating within the diffusion layer observed in experiments.

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