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The importance of kinetic ions in macro to micro-scale coupling during flux-rope interactions ADAM STANIER, WILLIAM DAUGHTON, LUIS CHACON, Los Alamos Natl Lab, HOMA KARIMABADI, SciberQuest, JONATHAN NG, YI-MIN HUANG, AMMAR HAKIM, AMITAVA BHATTACHARJEE, PPPL — Simulation studies of thin kinetic-scale reconnecting current sheets have found the rate of reconnection to be independent of both system-size and the specific mechanism that violates the frozen-in condition for ions and electrons. However, these studies typically neglect the formation of the sheet, and the potential coupling of the kinetic physics to the MHD-scale driver. Here we show for the magnetic island coalescence problem, which naturally includes this formation and coupling, that ion kinetic effects are crucial to describe many key features of this reconnection test-problem: the peak and average rates, pile-up field, outflow velocity, and global evolution of the system. These features can not be accurately decribed by the usual two-fluid models, such as Hall-MHD. The results presented are conceivably important for many reconnecting systems in nature, where macro to micro-scale coupling is important.

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