

Abstract Submitted
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Comparison of Secondary Islands in Collisional Reconnection to Hall Reconnection LUCAS SHEPHERD, PAUL CASSAK, West Virginia University — Secondary islands (plasmoids) self-consistently occur during collisional (Sweet-Parker) reconnection at high Lundquist numbers, as in the solar corona and many tokamaks. Previous numerical studies of the effect of secondary islands on the transition to collisionless (Hall) reconnection considered systems with no separation of scales between the collisional and collisionless states. In this study [1], the first resistive Hall-magnetohydrodynamic (Hall-MHD) simulations to separate the two scales are presented. Three main results are found. There exists a regime in which secondary islands occur during resistive reconnection without collisionless effects entering, with a reconnection rate faster than Sweet-Parker but slower than Hall reconnection. The reconnection rate increases substantially when Hall reconnection begins, showing that secondary islands are not the cause of the fastest reconnection rates. The onset of Hall reconnection leads to the ejection of the secondary islands in the vicinity of the X-line, implying that energy is released more rapidly during Hall reconnection.

[1] Shepherd and Cassak, Phys. Rev. Lett., 105, 015004 (2010)

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