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Spectral-element adaptive refinement magnetohydrodynamic simulations of the island coalescence instability[1] D. ROSENBERG, A. POUQUET, Inst. for Mathematics Applied to Geosciences, Natl. Center for Atmospheric Research, K. GERMASCHEWSKI, C.S. NG, A. BHATTACHARJEE, Space Science Center, Univ. of New Hampshire — A recently developed spectral-element adaptive refinement incompressible magnetohydrodynamic (MHD) code is applied to simulate the problem of island coalescence instability (ICI) in 2D. The MHD solver is explicit, and uses the Elsasser formulation on high-order elements. It automatically takes advantage of the adaptive grid mechanics that have been described in [Rosenberg, Fournier, Fischer, Pouquet, J. Comp. Phys., **215**, 59-80 (2006)], allowing both statically refined and dynamically refined grids. ICI is a MHD process that can produce strong current sheets and subsequent reconnection and heating in a high-Lundquist number plasma such as the solar corona [cf., Ng and Bhattacharjee, Phys. Plasmas, **5**, 4028 (1998)]. Thus, it is desirable to use adaptive refinement grids to increase resolution, and to maintain accuracy at the same time. Results are compared with simulations using finite difference method with the same refinement grid, as well as pesudo-spectral simulations using uniform grid.

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