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Extended MHD modeling on an arbitrary curvilinear adaptive grid VYACHESLAV S. LUKIN, LANL / PPPL, ALAN H. GLASSER, Los Alamos Nat'l Laboratory — A massively parallel spectral/(hp) element code (SEL)[1] is being developed at LANL in order to advance against the present day limitations on the existing plasma fluid codes imposed by the presence of a wide range of length/time scales and high degree of anisotropy in most plasmas of interest. Having previously demonstrated a highly accurate and efficient parallel operation of SEL on fixed non-uniform meshes, we now present the results of solving a two-fluid extended MHD system of equations in a 2D magnetic reconnection geometry on a logically rectangular adaptive mesh. To make that possible, a static grid rezoning algorithm has been implemented, where the computational grid is updated from time to time, whenever deemed necessary, without interrupting the simulation. A harmonic grid generator designed to be able to both align the grid with evolving magnetic field and to concentrate it in the regions lacking the desired spatial resolution is used to update the mesh. The new code's accuracy and efficiency is tested by reproducing the results of the GEM reconnection challenge. [2]

[1]A. H. Glasser and X. Z. Tang, Comp. Phys. Comm. **164** (2004).
[2]J. Birn, *et. al.*, J. Geophys. Res., **106**, pp. 3715-3720 (2001).

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