

Abstract Submitted
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Modeling Laboratory Plasmas with Smoothed Particle Hydrodynamics JEFFREY JOHNSON, UC Davis, Lawrence Livermore Nat'l Lab, MICHAEL OWEN, Lawrence Livermore Nat'l Lab — Smoothed Particle Hydrodynamics (SPH) [1], a mesh-free Lagrangian method long used to study astrophysical systems, is increasingly used to study more terrestrial applications in engineering. Here we present results of simulations of plasmas created in the laboratory calculated using a variant of Smoothed Particle Magnetohydrodynamics (SPMHD) [2] to treat the equations of resistive magnetohydrodynamics. We discuss the challenges posed by boundary conditions and the treatment of fields in a vacuum; we then describe simple test problems used to demonstrate how the method handles these challenges. Finally, we show the results of a calculation modeling the acceleration of a plasma with electric currents similar to those created in the Compact Toroid Injection Experiment (CTIX) [3]. References: [1] J. J. Monaghan, *Ann. Rev. Astron. Astrophys.* 30, 543 (1992) [2] D. J. Price, J. J. Monaghan, *MNRAS* 348, 139 (2004) [3] K. L. Baker et al, *Nucl. Fusion*, 42, 94 (2002)

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