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Smoothed Particle Hydrodynamics for the Simulation of Laser Produced Plasmas[1] ALEC GRIFFITH, Harvey Mudd College, TYLER HOLLADAY, Virginia Tech, MICHAEL S. MURILLO, CMSE Department, Michigan State University — To address the design and interpretation of experiments at next generation light sources such as at the SLAC LCLS and the LANL proposed MaRIE a simulation of the laser produced plasma targets has been developed. Smoothed particle hydrodynamics is used to capture the full experimental time and length scales, large degrees of deformation, and the experimental environment's open boundary conditions. Additionally the model incorporates plasma transport with thermal conduction, the electric potential, and a two species model of the electrons and ions. The electron and ion particle representations in SPH allow for time dependent ionization and recombination while addressing the disparate masses of the two species. To gain computational speedup our simulation takes advantage of parallelism, and to reduce computational cost we have explored using data structures such as the linked cell list and octree as well as algorithmic techniques such as the fast mutipole method. We will discuss the results of simulating several possible experimental configurations using our model.

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