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Modeling target normal sheath acceleration using handoffs between multiple simulations MATTHEW MCMAHON, CHRISTOPHER WILLIS, ROBERT MITCHELL, FRANK KING, DOUGLASS SCHUMACHER, KRAMER AKLI, RICHARD FREEMAN, The Ohio State University — We present a technique to model the target normal sheath acceleration (TNSA) process using full-scale LSP PIC simulations. The technique allows for a realistic laser, full size target and pre-plasma, and sufficient propagation length for the accelerated ions and electrons. A first simulation using a 2D Cartesian grid models the laser-plasma interaction (LPI) self-consistently and includes field ionization. Electrons accelerated by the laser are imported into a second simulation using a 2D cylindrical grid optimized for the initial TNSA process and incorporating an equation of state. Finally, all of the particles are imported to a third simulation optimized for the propagation of the accelerated ions and utilizing a static field solver for initialization. We also show use of 3D LPI simulations. Simulation results are compared to recent ion acceleration experiments using SCARLET laser at The Ohio State University. This work was performed with support from ASOFR under contract # FA9550-12-1-0341, DARPA, and allocations of computing time from the Ohio Supercomputing Center.

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