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Modeling plasma plumes generated from laser solid interactions SCOTT C. WILKS, D. P. HIGGINSON, A. J. LINK, H.-S. PARK, Y. PING, H. G. RINDERKNECHT, J. S. ROSS, Lawrence Livermore National Laboratory, C. ORBAN, Ohio State University, R. HUA, UCSD — Laser pulses interacting with solid targets sitting in a vacuum form the basis for a large class of High Energy Density physics experiments. The resulting hydrodynamical evolution of the target during and after this interaction can be modeled using myriad techniques. These techniques range from pure particle-in-cell (PIC) to pure radiation-hydrodynamics, and include a large number of hybrid techniques in between. The particular method employed depends predominately on laser intensity. We compare and contrast several methods relevant for a large range of laser intensities (from $I\lambda^2 \approx 1 \times 10^{12} W \cdot \mu m^2/cm^2$ to $I\lambda^2 \approx 1 \times 10^{19} W \cdot \mu m^2/cm^2$) and energies (from $E \approx 100 mJ$to $E \approx 100 kJ$.) Density, temperature, and velocity profiles are benchmarked against recent experimental data. These experimental data include proton radiographs, time resolved x-ray images, and neutron yield and spectra. Methods to self-consistently handle backscatter and detailed energy deposition will also be discussed. LLNL-ABS-697767. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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