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A detailed study of bubble and spike velocities in ejecta VARAD KARKHANIS, PRAVEEN RAMAPRABHU, University of North Carolina, Charlotte, FRANK CHERNE, JAMES HAMMERBERG, MALCOLM ANDREWS, Los Alamos National Laboratory — We use detailed continuum hydrodynamics and molecular dynamics simulations to characterize bubble and spike growth in shock-driven ejecta. Insights from the simulations are used to suggest a modified expression for the velocity associated with ejected spike structures, while a recently proposed model [1] explains the observed bubble velocities. For spikes, existing models [2] can overpredict observed spike velocities if they do not include the modification of the initial spike growth rates due to nonlinearities. Instead, we find that using the potential flow model of [2], corrected with a suitable nonlinear prefactor leads to predictions in close agreement with our simulation data. We propose a simple empirical expression for the nonlinear correction for spike velocities that is able to reproduce results from our simulations and published experimental and simulation data over a wide range of initial conditions and Mach numbers. We verify these ideas with simulations (continuum and MD) at different amplitudes, initial perturbation shapes, and shock strength. This work was supported by the Los Alamos National Laboratory. [1] K. O. Mikaelian, Phys Rev Lett 80, 508 (1998). [2] Q. Zhang, Phys Rev Lett 81, 3391 (1998).

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