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Bubble and spike velocities in shock-driven ejecta VARAD KARKHANIS, PRAVEEN RAMAPRABHU, UNC Charlotte, JAMES HAMMERBERG, FRANK CHERNE, MALCOLM ANDREWS, Los Alamos National Laboratory, NM — Using detailed continuum hydrodynamics and molecular dynamics simulations, we apply the nonlinear Richtmyer-Meshkov theory to characterize bubble and spike growth in shock-driven ejecta. We find the asymptotic bubble velocity prediction given by [1] is in excellent agreement with the simulations, when a nonlinear correction for bubbles suggested by [2] is used in that model. Asymptotic spike velocities on the other hand, depend on the initial conditions such as the initial amplitudes, and spike curvature as pointed out by [3]. The asymptotic spike velocities are predicted by applying separate correction factors to the initial growth rate [from 4] as well as the late-time velocities, where both effects can depend on the initial amplitudes [2,5]. For non-sinusoidal surfaces, the expressions for spike and bubble velocities must be modified [6] by replacing the perturbation wavelength with λ_{eff}, the effective wavelength of an equivalent sinusoid with the same missing area. We verify these ideas with simulations (continuum and MD) at different amplitudes, initial perturbation shapes, and shock strength. [1] K. O. Mikaelian, Phys Rev Lett 80, 508 (1998). [2] W. T. Buttler et al., J Fluid Mech 703, 60 (2012). [3] Q. Zhang, Phys Rev Lett 81, 3391 (1998). [4] K. A. Meyer and P. J. Blewett, Phys Fluids 15, 753 (1972). [5] G. Dimonte and P. Ramaprabhu, Phys Fluids 22, 014104 (2010). [6] F. J. Cherne et al., J Appl Phys 118, 185901 (2015).

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