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Time dependent boundary conditions for large scale atomistic simulations of Richtmyer-Meshkov instabilities[1] J.E. HAMMERBERG, R. RAVELO, T.C. GERMANN, Los Alamos National Laboratory — Shock induced Richtmyer-Meshkov instabilities at perturbed metal vacuum/gas interfaces result in metal material ejecta. For strong shock waves, the material ejected is initially in the form of fluid sheets when the machining grooves are two-dimensional. These sheets ultimately break up to form a distribution of droplets. Large-scale non-equilibrium molecular dynamics simulations of Richtmyer-Meshkov instabilities allow the investigation of the dynamics of the breakup process but are limited in length and time scales by rarefaction wave reflections at the boundaries, which put the material behind the perturbed interface under tension eventually leading to spall. A time-dependent boundary condition based on the self-similar character of the release wave is shown to mitigate boundary reflections and reduce unwanted tensile waves behind the perturbed interface zone and thereby can be used to increase the wavelength and time scale for breakup simulations. We discuss the details of this method and results of NEMD simulations of a shocked Cu interface with a single mode perturbation characterized by a wavelength of $\lambda = 13$ nm and a wavenumber amplitude product $kh_0 = 1/2$.

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