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Quantification of Ejecta from Shock-Loaded Metal Surfaces BRENDAN A. KULLBACK, Virginia Tech, Los Alamos National Laboratory, MARK D. CARRARA, GUILLERMO TERRONES, Los Alamos National Laboratory, MUHAMMAD HAJJ, Virginia Tech — Mass ejecta from shock-loaded surfaces with finite disturbances were calculated for different elastic-perfectly plastic metals with the Mie-Gruneisen equation of state and with varying disturbance amplitudes (h), wave numbers (k), and geometric shapes. In our simulations, the disturbance extends periodically in the transverse direction and the perturbed free surface is subjected to a single normal shock. The total ejected mass was found to depend on kh (the product of the wave number and the initial amplitude of the disturbance) and $(P/Y_0)^{1/2}$ (where P is the shock pressure and Y_0 is the metal yield stress). For specific shapes of the disturbance, there seems to be a unique relation between the ratio of the total ejected mass and the mass removed by the disturbance. In addition, we found the cutoff condition $(kh)_C$ below which no ejecta can be produced. Generally, the amount of mass ejected increases with kh. However, a striking feature near the ejecta cutoff is the existence of a finite region $(kh)_C \leq kh \leq (kh)_T$ where the ejected mass decreases with kh. For all the metals and shock conditions we have considered, the ejecta production increases monotonically for the range of kh values we have computed above $(kh)_T$. This effect and the global behavior of mass ejecta will be discussed.

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