

Abstract Submitted
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Calculated Ductile Damage and Stress Histories from Plate Impacts Compared with those from HE Loadings DAVIS TONKS, CURT BRONKHORST, JOHN BINGERT, Los Alamos National Lab — It is well known that the stress profiles involved in plate impacts and HE (High Explosive) loadings differ. The former is often called a square wave profile while the latter is called a triangular wave profile (Taylor HE wave). It is also known from recovery experiments that the spatial damage profile of plate impacts is more concentrated than that of HE loading. This is thought to be the reason why the damage level in plate impacts is higher than with HE loading for the same peak driving pressure. Simple elastic wave models of the loading are useful to mentally visualize the evolution of the loading stress waves, but the effect on damage evolution and damage spatial profile is more difficult to imagine. The purpose of this work is to perform simulations of the two kinds of experiments using an existing ductile damage model for tantalum or copper to better illustrate the history and damage magnitude effects. The model includes void nucleation, time dependent void growth, void coalescence, and fracture. Computational results will be presented to elucidate and clarify the coupling between the loading profiles and damage.

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