Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Continuum damage modeling in ductile materials using level sets[1]

ALEXIA DE BRAUER, H. S. UDAYKUMAR, Univ of Iowa — Ductile materials under high-velocity impact undergo large deformation and eventually damage. Damage alters the mechanical behavior of the materials and can lead to fracture and fragmentation. This work proposes a general Eulerian framework to model fracture and interfacial debonding in ductile materials. The current effort focuses on a plate impact problem, where a crack forms due to damage accumulation causing a discontinuity in the material. Damage accumulation is described by the continuum damage models. The level set approach is adopted for both tracking the sharp material interfaces and creating the crack. Results are found to be in good agreement with experimental data and two other commercial codes, CTH and EPIC. Also, damage is considered at the interfaces between two bonded materials, such as particles embedded in a matrix in a composite material. The progressive decohesion of the interfaces due to dynamic loading is simulated via a cohesive zone model. The result shows the ability of the code to handle the separation of the interfaces and create voids.

[1]This work has been funded from the AFRL-RW, Computational Mechanics Branch, Eglin AFB, Program Manager: Dr. Angela Diggs

Alexia De Brauer
Univ of Iowa

Date submitted: 20 Feb 2017 Electronic form version 1.4