Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Ensemble averaged equations for cavity growth and material pulverization[1] DUAN ZHANG, CHRISTOPHER LONG, Los Alamos National Laboratory — In cases of high-speed impact or shock loading, materials go through cavity growth, spall, and pulverization, while the materials change from a continuum state to a disperse, pulverized state. This work concerns the description of the material when it changes from a continuum phase to a disperse state or vice versa. The debris cloud needs to be considered as a field containing debris pieces of various sizes and shapes, as debris fragments are often too numerous to account for individually. We use the ensemble averaging method to derive averaged equations and closure terms that are applicable to this transition of the material phases. There are explicit expressions relating the closure terms to lower length scale physics. Using these expressions, the closure terms can be calculated by direct numerical simulations, or can be modeled from the understanding of the lower length scale physics. One of the closures required is the relation between the material deformation and macroscopic velocity field. This model is not typically studied by material experiments intended for constitutive relations of the material, but it is critical for correct prediction of material deformation from cavity growth to eventual breakup. In this talk we provide two examples for these models.

[1]Work supported by next generation code project of LANL.

Duan Zhang
Los Alamos National Laboratory

Date submitted: 08 Nov 2016 Electronic form version 1.4