Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Multiscale modeling of composites subjected to high speed impact[1] MINHYUNG LEE, MYUNG S. CHA, Sejong University, SHU SHANG, NAM H. KIM, Univ. of Florida — The simulation of high speed impact into composite panels is a challenging task. This is partly due to the fact macro-scale simulation requires integrating the local response at various locations, i.e. integration points. If a huge number of integration points exist for enhanced accuracy, it is often suggested to calculate the micro-scale simulation using massive parallel processing. In this paper, multiscale modeling methodology has been applied to simulate the relatively thick composite panels subjected to high speed local impact loading. Instead of massive parallel processing, we propose to use surrogate modeling to bridge micro-scale and macro-scale. Multiscale modeling of fracture phenomena of composite materials will consist of (1) micro-scale modeling of fiber-matrix structure using the unit-volume-element technique; (2) macro-scale simulation of composite panels under high strain-rate impact using material response calculated from micro-scale modeling; and (3) surrogate modeling to integrate the two scales. In order to validate the predictions, first we did the material level lab experiment such as tension test. And later we also did the field test of bullet impact into composite panels made of 4 ply and 8 ply fibers. The impact velocity ranges from 300 $\sim$ 600 m/s.

[1]Special Thanks to grants (UD120053GD)

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Date submitted: 29 Jan 2015 Electronic form version 1.4