Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Waves in Periodic Dissipative Laminate Metamaterial Generated by Plate Impact[1] PEDRO FRANCO NAVARRO, DAVID BENSON, VITALI NESTERENKO, University of California, San Diego — Waves generated by plate impact loading of Al/W laminates with different size of cell were investigated numerically depending on the impactor/cell mass ratio. The materials model took into account viscoplastic behavior of materials. It was observed that this mass ratio has a direct impact on the structure of stress pulses traveling through the composite. At the small impactor/cell mass ratio travelling waves closely resembling solitary waves were quickly formed near the impacted surface. They propagate as quasistationary weakly attenuating localized pulses. The properties of these pulses were satisfactory described based on a theoretical model using dispersive and nonlinear parameters of the materials similar to solitary solutions for the Korteweg-de Vries equation (KdV). The temperature at given pressure at the maximum is dramatically different then the temperature corresponding to the shock wave at the same pressure reflecting a different paths of loading. Increase of impactor/cell mass ratio results in the train of solitary like pulses which number increased with the increase of the impactor/cell mass ratio. At large impactor/cell mass ratio oscillatory stationary shock waves were formed. The leading front of these stationary shock waves was closely described by a solitary like pulse observed at small impactor/cell mass ratio.

[1]One of the authors (PFN) was supported by UCMexus Fellowship

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Date submitted: 21 Jan 2015 Electronic form version 1.4