SIMULATION OF LIGHWEIGHT ENERGY ABSORBING MATERIALS ON STRUCTURES UNDER BLAST LOAD

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Abstract: *Energy absorbing materials like foam or honeycomb are area of interest in blast protection because of their ability to absorb energy through plastic deformation. The mechanism to do this is after reaching their yield stress, these materials exhibit a region of constant stress for increasing strain until the material is completely compacted. The energy which is needed to crush the material is proportional to the area under the stress-strain curve. Because foams and honeycombs have their specific "plateau" region, they absorb a considerable amount of energy relative to their low density. Samples from these materials are investigated to determine if their energy absorbing abilities can be used to mitigate the load and shock transferred to a vehicle structure subject to blast loading.*

The method use is ballistic pendulum and the experiments show that energy absorbing materials increase the imparted impulse from a blast. This behavior was in contrary to results that were expected so computational models were created in LS-DYNA to understand the phenomenon that causes an increase in imparted impulse. ConWep and Arbitrary-Lagrangian-Eulerian (ALE) techniques were used in simulations to demonstrate their curtain efficiency and accuracy.

Keywords: *lightweight materials, energy absorbing, blast load, LS-DYNA, simulations.*

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