

PROPOSED INERTIAL BLAST MITIGATION DEVICE

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ABSTRACT

Passive control of structures to sustain blast loads is highly important, but the literature and current technologies are rather limited. The major obstacle in this case lies in the fact that the control system should operate during a very short period of time. In this work it is proposed to overcome this difficulty by changing the structure into a mechanism and by using a shear passive control devices attached to the structural members in a sophisticated manner to form "Passive controlled structure mechanism". The shear passive control devices are designed so that under mundane loading the structure is a fully constrained. In the case of blast loadings, the structure is transported to controlled-mechanism and the forces acting on the structural elements are defined by the forces induced by the shear passive control devices. These forces are designed not exceed the structural elements capacity and the structure is not damaged or collapsed by the blast. By using an analytical and a finite element model it is shown that by using the proposed passive controlled structure mechanism a reduction of an order of magnitude in the structural element bending moments, axial and shear forces can be achieved.