THE DYNAMIC BEHAVIOR OF ECCENTRIC TUBES SYSTEM AS A SUPPORT FOR PROTECTIVE STRUCTURES

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Blast wave or direct kinetic impact, may cause very high dynamic load on protective structures such as concrete or steel slabs. Usually, these structures are supported by the building foundations. The high dynamic load that is transferred by the protective structure to the building foundations can cause damage. The purpose of this research is to investigate the dynamic behavior and effectiveness of a eccentric tubes system as an energy absorbing structure, aimed at protecting structures.

Energy absorbing structures are usually effective for a specific small range of impact loads to which they were designed. These structures are stiff for low-impact loads and soft for high-impact loads. The proposed system, made of several tubes, each one has different stiffness, should provide a good solution for a wide range of impact loads.

The research was conducted using numerical simulations and laboratory dynamic experiments. The simulations were done using the FEM software – ANSYS LS-DYNA, and the dynamic experiments were conducted using the Impact Pendulum of the PTR&DC at the Ben Gurion University. The research was conducted using several tube dimensions (diameters and thicknesses) and several materials, in order to calibrate and validate the numerical model. The results of the research confirm the possibility to use these structures as a support for the protective structures.