HIGH VELOCITY IMPACT RESPONSE OF CARBON FIBER COMPOSITE SANDWICH STRUCTURES WITH PYRAMIDAL LATTICE CORE

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Abstract. In this research, carbon fiber composite sandwich structures with pyramidal lattice core which subjected high velocity impact in regime ranging form 180 to 2000 m/s have been investigated by experimental and numerical methods. Experiments using a gas gun are conducted to investigate the impact process and to validate the FE model. Energy absorption efficiency (EAE) in sandwich structures with different face-sheets thickness is investigated. According to results of experiments and numerical calculations, thin face-sheets sandwich panels have a good energy absorption efficiency under relative higher velocity impact; by contraries, a superiorly energy absorption efficiency is displayed in thick face-sheets sandwich panels under relative lower velocity impact. Subsequently, energy absorption efficiency in carbon fiber composite sandwich panels is compared with that in 304 stainless-steel and aluminum alloy lattice core sandwich structures. In a specific impact energy range,
energy absorption efficiency in carbon fiber composite sandwich panels is higher than that in 304 stainless-steel sandwich panels and aluminum alloy sandwich panels, since big density of metal materials. So, in addition to achieve multi-functional applications, carbon fiber composite sandwich panels have a potential advantage to substitute the metal sandwich panels to use in high velocity impact resistance structures under a specific impact energy range.

**Key words:** Carbon fiber composite, lattice core sandwich structures, High velocity impact, Numerical model.