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Title: Collapse mechanisms of metal foam matrix composites under static and dynamic loading conditions

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Abstract: The collapse mechanisms of metal foam matrix composites under static and dynamic loading conditions were experimentally and analytically investigated. Closed-cell aluminium foam AlSi10 with 325 +/- 10 kg/m(3) density was used as core material, while stainless-steel-mesh is the faces materials. Prior to characterizing the composite sandwich structure, the stainless steel mesh face material and closed-cell aluminium foam were characterized by tensile testing and compression testing, respectively. Experimental tests were performed on sandwich beams using both High Speed Camera and Digital Image Correlation system for strain distribution. All experimental tests were performed at room temperature with constant crosshead speed of 1.67x 10(-4) m/s for static tests and 2 m/s impact loading speed for dynamic tests. Two main deformation behaviours of investigated metal foam matrix composites were observed following post-failure collapse: face failure and core shear. It was showed that the initiation, propagation and interaction of failure modes depend on the type of loading, constituent material properties and geometrical parameters.

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