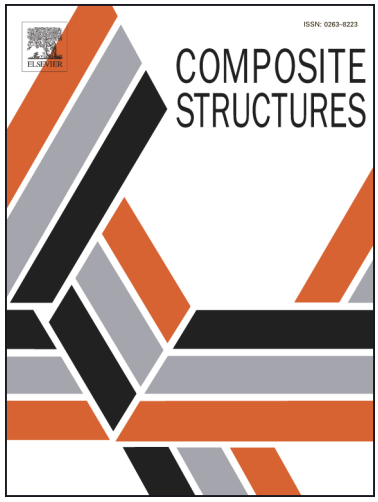

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Progressive failure of 3-D textile composites under impact loadings

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Abstract

Progress of dynamic failure of 3-D textile structural composites have not been sufficiently studied. This work is aimed to investigate the progressive failure of 3-D braided, biaxial warp-knitted and angle-interlock woven composites by high-speed imaging system during impact loadings. Real-time images are listed frame by frame and located in stress-strain curves. There is a sharp decrease stage and a steady decrease stage in stress under catastrophic failures. These two stages reveal different damage morphologies in progressive failures. For the out-of-plane impact compression, if there is no catastrophic failure, composites get limited rebound because of structural recovery of their reinforcements. If catastrophic failure occurs, composite structures would be split. For the in-plane impact compression, the 3-D braided, biaxial warp-knitted and angle-interlock woven structures protect themselves from being thoroughly split under explosive cracks / shear / delamination failures.

Keywords

textile composites; progressive failure; impact loading

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