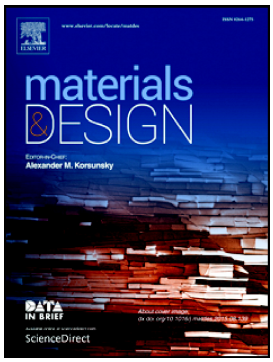

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AXIAL COMPRESSIVE COLLAPSE OF ULTRALIGHT CORRUGATED SANDWICH CYLINDRICAL SHELLS

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Abstract Ultralight all-metallic sandwich cylindrical shells with corrugated cores are designed and fabricated using a method involving tamping and shape correction. Quasi-static axial compressive behaviors of the sandwich shells are investigated using a combined experimental, theoretical and numerical approach. Based on the analytical model and numerical approach, systematic parametric study is carried out to explore the effects of key geometrical parameters on the failure load and energy absorption capacity. Minimum weight design as a function of the failure load is subsequently carried out for the proposed sandwich shell. As an attempt for further performance enhancement, the foam-filled corrugated-core sandwich cylindrical shell is proposed and a preliminary experimental study is carried out. The superiority of sandwich shells over monolithic shells in terms of initial failure load and energy absorption is clearly demonstrated, potentially important for applications demanding simultaneous ultra-lightweight, load-bearing and energy absorption.

Keyword: Sandwich cylindrical shell; Corrugated core; Axial compression; Minimum weight design

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