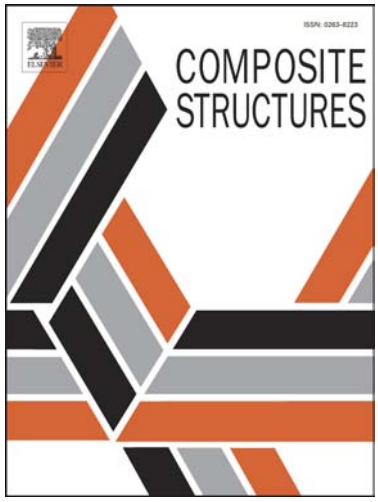

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Majid Moeinifard, Gholamhossein Liaghat, Gholamhossein Rahimi, Ali Talezadehlari, Homayoun Hadavinia

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Experimental investigation on the energy absorption and contact force of unstiffened and grid-stiffened composite cylindrical shells under lateral compression

Majid Moeinifard[a], Gholamhossein Liaghat[a,b*], Gholamhossein Rahimi[a], Ali Talezadehlari[a], Homayoun Hadavinia[b]

[a] Faculty of Mechanical Engineering, Tarbiat Modares University, P.O.Box 15115-111, Tehran, Iran.

[b] School of Mechanical and Automotive Engineering, Kingston University, London, U.K.

Abstract

In this paper, two different types of unstiffened and lozenge grid-stiffened E-glass/Epoxy composite cylindrical shells are experimentally investigated under lateral compression. The composite shells are compressed in two different loading conditions; between two rigid flat platens and between a rigid flat platen and a rigid cylindrical indenter which is aligned perpendicular to the shell axis. The effects of the grid stiffeners on the stiffness, contact force and energy absorption capacity of the composite cylindrical shells are investigated in the two mentioned loading conditions. Incorporation of grid stiffeners in the composite cylindrical shells leads to an increase in the structural stiffness, contact force and energy absorbing capacity in both loading conditions. Furthermore, it is observed that the effect of the stiffeners on the structural stiffness is dominant in the elastic deformation stage of the compression processes. The results show that stiffening the composite cylindrical shells with lozenge grid stiffeners can increase the specific energy absorption almost twice in comparison with the unstiffened composite shells; and among all of the specimens, the grid-stiffened structures compressed between two rigid flat platens have the highest specific energy absorption, while the unstiffened structures compressed by the cylindrical indenter have the least capacity to absorb energy.

*Corresponding author at: Faculty of Mechanical Engineering, Tarbiat Modares University, P.O. Box 75914–353, Tehran, Iran. Tel: +98-2182883387
E–mail address: Ghlia530@modares.ac.ir (Gh. Liaghat).