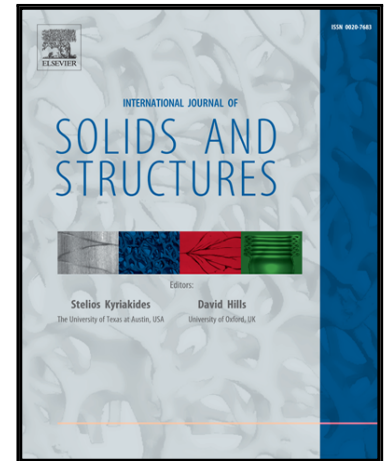


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Experiments on Imperfection Insensitive Axially Loaded Cylindrical Shells

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Abstract

This paper presents an experimental study of imperfection insensitive composite wavy cylindrical shells subject to axial compression. A fabrication technique for making cylindrical shells with intricate shape of cross-sections has been developed. A photogrammetry technique to measure the geometric imperfections has also been developed. The behavior of the wavy shells under axial compression was predicted through simulations and measured through compression tests. Both the analyses and experiments have confirmed that the wavy shells are imperfection insensitive. Comparisons between the wavy shells and circular shells have also confirmed that introducing optimal symmetry-breaking wavy cross-sections can significantly reduce the imperfection sensitivity and improve the load-bearing capability of cylindrical shells.

Keywords: Wavy shell, Imperfection, Compression test

1. Introduction

The buckling load of circular cylindrical shells subject to axial compression is extremely sensitive to even very small geometric imperfections ([Brush and Almroth, 1975](#)). An imperfection with amplitude of one shell thickness could reduce the buckling load to only 20% of the buckling load of the corresponding

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