

## Free vibration analysis of two novel spherical-roof contoured cores (SRCC) : A numerical study

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### ABSTRACT

In recent years, sandwich structures have been increasingly developed as advanced composite structural components. Different core designs of sandwich structure have been proposed and investigated to improve the structural performance in aerospace industry, which is generally made of aluminium, carbon fibre-reinforced plastics (CFRP) and glass fibre-reinforced plastics (GFRP). It is a challenging task to reduce the impact influence on vibration behaviour as core structure, while still maintains the excellent strength and structural performance. This paper aims to investigate the free vibration characteristics of the spherical-roof contoured cores (SRCC) as core structure in sandwich panel. The two novel core designs, three types of materials and two boundary conditions were investigated using the finite element method. It was shown that glass fibre-reinforced plastic material could have much more mode numbers on common and novel core designs comparing with metal and CFRP materials. It was concluded that the metal, CFRP and GFRP materials had nearly same trend as the mode increased. Moreover, natural frequency, maximum magnitude and mode shape were determined in this study.

### KEYWORDS

Cfrp; Contoured core; Free vibration analysis; Gfrp; Novel spherical-roof core; Srcc

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