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Abstract

This paper presents the studies carried out for improving the acoustic behavior of truss core sandwich panel, which is mostly used in aerospace structural applications. The empty space of the truss core is filled with polyurethane foam (PUF) to achieve better vibro-acoustic and sound transmission loss characteristics. Initially equivalent elastic properties of the foam filled truss core sandwich panel are calculated. Then, the vibration response of the panel under a harmonic excitation is obtained based on the equivalent 2D finite element model. Finally, the vibration response is given as an input to the Rayleigh integral code built in-house to obtain the acoustic and sound transmission loss characteristics. The results revealed that PUF filling of the empty space of the truss core, significantly reduces resonant amplitudes of both vibration and acoustic responses. It is also observed that foam filling reduces the overall sound power level significantly. Similarly, sound transmission loss studies revealed that, sudden dips at resonance frequencies are significantly reduced. Also an experiment is conducted on forced vibration response of honeycomb core sandwich panel to show that equivalent 2D model can be used for predicting sound power level and transmission loss behavior.

Keywords: Sandwich panel, 2D equivalent model, Sound Transmission Loss, Acoustic response, Truss Core and Foam Filled.

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