Journal of Mechanical Engineering Volume 17, Issue 3, Pages 27 - 38October 2020

Analysis of Sound Transmission Loss on Perforated-Natural Fibre Sandwich Panels

Absract
Sound transmission loss (STL) is a study about the sound energy that is prevented from transmitting through a wall or a partition, it is essential especially for noise insulation applications. The main aim of this study is to investigate and analyse the STL capability of perforated-natural fibre sandwich panels, which acted as sound insulation material. The objective of this study is to determine the effect of perforation diameter of perforated panel on STL, as well as to determine the optimum hybridisation combination sandwich panel of perforated panel with natural fibre that deliver good STL. In this study, STL measurement was carried out by using two-load impedance tube method coupled with LMS Test Lab software and LMS SCADAS Mobile DAQ system. Natural fibres used in this study are coconut fibre, oil palm fibre, and pineapple leaf fibre. The natural fibres were prepared in cylindrical shape with three different thicknesses of 1 cm, 2 cm, and 3 cm to fit into the sample holder of impedance tube. Each natural fibre will be tested after it was hybridised with a perforated panel of different perforation diameter size and the STL measurement results are obtained and analysed. The measurement results show all samples had reached their highest STL at the frequency range 3000 Hz to 4000 Hz. In addition, pineapple leaf fibre hybridised with a perforated panel of 3 mm's perforation diameter is considered the optimum combination where it achieved the highest STL of 71.80 dB among all the test samples.

Keywords

Sound transmission loss (STL), impedance tube, perforatedpanel, natural fibre