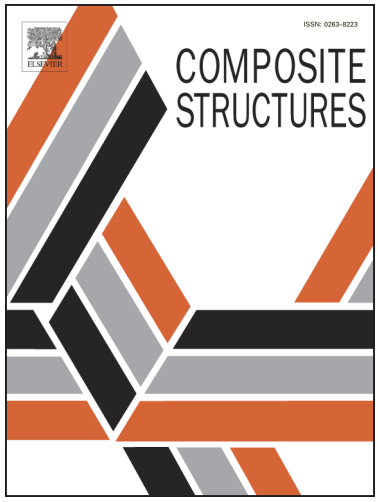

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Enhanced Vibration damping and dynamic mechanical characteristics of composites with novel pseudo-thermoset matrix system

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Abstract

This paper presents the details of vibration damping enhancement offered by the composites made up of thick and thin plies of carbon fibres with a novel liquid Methylmethacrylate (MMA) thermoplastic resin possessing characteristics similar to thermoset resin. After developing the novel composite system, its damping attributes are studied and a baseline comparison is carried out with a carbon fibres/epoxy resin composite system. The liquid MMA was found to be 27% more efficient in improving the structural damping compared to the epoxy resin. The increase in the dynamic loss modulus and loss factor calculated from the dynamic mechanical analysis (DMA) tests confirmed the positive influence of the reactive liquid MMA resin and the thin plies in dampening the vibrations. The vibration tests carried out indicated an increase in the damping ratio with the decrease in the individual ply thickness. The damping capacity at room temperature and at the glass transition temperature of carbon fibre/liquid MMA composites was found respectively 13% and 74% higher than the carbon/epoxy composite system. The details of the vibration and DMA tests conducted along with the rationale and underlying reasons for the accomplished advantages of the thin plies and liquid MMA resin composites system in vibration damping are presented.

Keywords:

Thin ply; MMA; carbon fibres; vibration damping; DMA.

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