

Accepted Manuscript

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PII: S0263-8223(16)31397-6

DOI: <http://dx.doi.org/10.1016/j.compstruct.2016.12.046>

Reference: COST 8101

To appear in: *Composite Structures*

Received Date: 31 July 2016

Revised Date: 25 October 2016

Accepted Date: 5 December 2016



Please cite this article as: Rajesh, M., Pitchaimani, J., Experimental Investigation on Buckling and Free Vibration Behavior of Woven Natural Fiber Fabric Composite Under Axial Compression, *Composite Structures* (2016), doi: <http://dx.doi.org/10.1016/j.compstruct.2016.12.046>

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Experimental Investigation on Buckling and Free Vibration Behavior of Woven Natural Fiber Fabric Composite Under Axial Compression

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Abstract

Influence of axial compression load on buckling and free vibration characteristics of natural fiber fabric polymer composite beam is analyzed experimentally. Critical buckling strength, free vibration frequencies and modal loss factors are obtained and analyzed. It is found that buckling strength increases with number of layers of fabric in composite. It is also observed that weaving pattern of the fabric influences buckling strength of the composite and basket type woven fabric enhances the buckling strength compared to plain and herringbone woven fabric composites. Sandwich composites with glass fiber fabric facing layer and natural fiber fabric as core layer having higher buckling strength. Free vibration frequency reduces with increase in axial compression load while modal damping factor increases in the pre-buckling region. However, this behaviour reverses in the post-buckling region. The load-deflection obtained experimentally is compared with finite element result obtained considering the geometric non-linearity.

Keywords: Fabrics/textiles; Vibration; Compression moulding; Weaving; Buckling

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