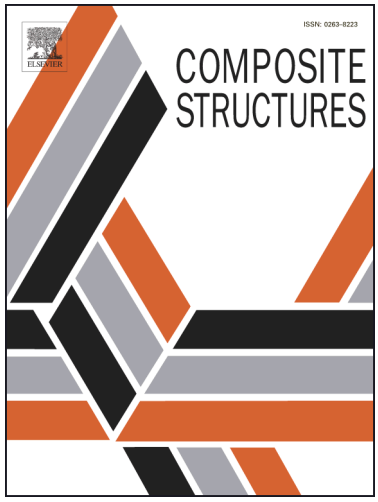
Accepted Manuscript



A mechanical degradation model for bidirectional natural fiber reinforced composites under hydrothermal ageing and applying in buckling and vibration analysis

K.F. Wang, B.L. Wang

PII: S0263-8223(18)32277-3
DOI: https://doi.org/10.1016/j.compstruct.2018.08.063
Reference: COST 10113

To appear in: *Composite Structures*

Received Date: 26 June 2018
Revised Date: 6 August 2018
Accepted Date: 27 August 2018

Please cite this article as: Wang, K.F., Wang, B.L., A mechanical degradation model for bidirectional natural fiber reinforced composites under hydrothermal ageing and applying in buckling and vibration analysis, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.08.063

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A mechanical degradation model for bidirectional natural fiber reinforced composites under hydrothermal ageing and applying in buckling and vibration analysis

K.F. Wang, B.L. Wang *

Graduate School at Shenzhen, Harbin Institute of Technology, Harbin 150001, PR China

Abstract: Natural fiber reinforced composites may have a great potential applications in the automotive and aerospace industries. Hydrothermal ageing in natural fiber reinforced composites leads to significantly degradation of their mechanical properties. This paper proposes a theoretical model for predicting the mechanical responses of bidirectional natural fiber reinforced composites under hydrothermal loading. Nine elastic coefficients of orthotropic composites after hydrothermal reaction and moisture absorption are obtained. Based on the present model, closed-form solutions for buckling load and frequency of a simply supported composite plate are derived. It is found that the elastic module and buckling load decrease monotonously with time, and approaches to a certain value with time. However, the frequency decreases with time firstly, and then increases with time, finally approaches to a certain value with time. In addition, the degradation of elastic modulus, buckling load and frequency for the composites with high fiber content are larger than those with low fiber content. This research may be helpful for designing natural fiber reinforced composites for applications in humid environments.

Keywords: Natural fiber reinforced composite; moisture absorption; hydrothermal reaction; buckling; vibration.

*Corresponding author: Email address: wangbl2001@hotmail.com

Download English Version:

https://daneshyari.com/en/article/10131667

Download Persian Version:

https://daneshyari.com/article/10131667

Daneshyari.com