## **Accepted Manuscript**

Elasticity Solutions of Simply Supported Laminated Cylindrical Arches Subjected to Thermo-loads

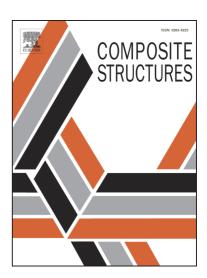
Hai Qian, Ding Zhou, Weiqing Liu, Hai Fang, Weidong Lu

PII: S0263-8223(15)00347-5

DOI: http://dx.doi.org/10.1016/j.compstruct.2015.04.052

Reference: COST 6400

To appear in: Composite Structures



Please cite this article as: Qian, H., Zhou, D., Liu, W., Fang, H., Lu, W., Elasticity Solutions of Simply Supported Laminated Cylindrical Arches Subjected to Thermo-loads, *Composite Structures* (2015), doi: http://dx.doi.org/10.1016/j.compstruct.2015.04.052

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.

## CCEPTED MANUSCRIPT

Elasticity Solutions of Simply Supported Laminated Cylindrical Arches

Subjected to Thermo-loads

Hai Qian, Ding Zhou, Weiqing Liu, Hai Fang, Weidong Lu (College of Civil Engineering, Nanjing Tech University, Nanjing 211816, P. R. China)

**Abstract**: According to the exact thermo-elasticity theory, the elasticity solution of the simply

supported laminated arches subjected to thermo-loads was investigated. An analytical method was

present to solve the stress and displacement fields in the arches. Firstly, the general solutions of

temperature, displacement and stress fields in single-layered simply supported arch were obtained

by solving the heat conduction equation and the elasticity equations in the polar coordinates

system, respectively. Then, the temperature, displacements and stresses between the outer surface

and the inner surface of the arched layer were derived. Based on the continuity of temperature,

heat flux, displacements and stresses on the interface of two adjacent layers, the relationships of

temperature, displacement and stress between the outermost surface and the innermost surface of

the laminated arch were recursively generated by using the transfer matrix method. The unknown

coefficients in the solutions were uniquely determined by the use of the outermost surface and the

innermost surface conditions of the arch. The distributions of temperature, displacements and

stresses in the arch were got by substituting the unknown coefficients back to the recurrence

formulae and the solutions for every layer. The convergence of the solutions was checked with

respect to the number of the terms of series. Comparing the results with those obtained from the

finite element method, the correctness of the present method was verified. Finally, the effects of

surface conditions, arch thickness, layer number and material properties on the distributions of

temperature, displacements and stresses in the arch were discussed in detail.

**Keywords**: layered arch; temperature; stress; transfer matrix; elasticity solution

1

## Download English Version:

## https://daneshyari.com/en/article/6706641

Download Persian Version:

https://daneshyari.com/article/6706641

<u>Daneshyari.com</u>