Accepted Manuscript

Accurate buckling ssolutions of grid-stiffened functionally graded cylindrical shells under compressive and thermal loads

Jiabin Sun, C.W. Lim, Xinsheng Xu, He Mao

PII: S1359-8368(15)00695-2

DOI: 10.1016/j.compositesb.2015.11.020

Reference: JCOMB 3894

To appear in: *Composites Part B*

Received Date: 24 February 2015

Revised Date: 30 August 2015

Accepted Date: 20 November 2015

Please cite this article as: Sun J, Lim CW, Xu X, Mao H, Accurate buckling ssolutions of grid-stiffened functionally graded cylindrical shells under compressive and thermal loads, *Composites Part B* (2015), doi: 10.1016/j.compositesb.2015.11.020.

Accurate buckling solutions of grid-stiffened functionally graded cylindrical shells under compressive and thermal loads

Jiabin Sun[1*], C.W. Lim[2], Xinsheng Xu[3], He Mao[1]

[1]State Key Laboratory of Structural Analysis for Industrial Equipment and School of Ocean Science and Technology, Dalian University of Technology, Panjin, 124221, P.R. China

[2]Department of Civil and Architectural Engineering, City University of Hong Kong, Hong Kong, P.R. China

[3]State Key Laboratory of Structural Analysis for Industrial Equipment and Department of Engineering Mechanics, Dalian University of Technology, Dalian, 116024, P.R. China

Abstract

Buckling behaviors of shear deformable grid-stiffened functionally graded cylindrical shells are investigated under the combined compressive and thermal loads. The governing equations are established on the basis of Reddy's higher-order shear deformation theory. For the perfect grid-stiffened cylindrical shells, separation of variables is employed to obtain the accurate buckling solutions. Then, according to the derived mode functions, Galerkin's solving procedure is conducted for shells including the initial geometric imperfection. The effects of geometric parameters, properties of FGMs and temperature fields on the anti-buckling performances of grid-stiffened shells are concerned under the clamped boundary condition. Besides, imperfection sensitivities for various reinforced grids are discussed in detail.

Keywords: A. Ceramic-matrix composites (CMCs); B. Buckling; B. Thermal properties; C. Analytical modeling; Grid-stiffened cylindrical shell

[*]Corresponding author. Tel.: +86 427 2631888; fax: +86 427 2631888.
E-mail address: jbsun1983@dlut.edu.cn.