# Accepted Manuscript


Postbuckling of sandwich plates with graphene-reinforced composite face sheets in thermal environments

Yin Yu, Hui-Shen Shen, Hai Wang, D. Hui

PII: S1359-8368(17)32536-2

DOI: 10.1016/j.compositesb.2017.09.045

Reference: JCOMB 5292

To appear in: *Composites Part B*

Received Date: 26 July 2017

Revised Date: 18 September 2017

Accepted Date: 20 September 2017

Please cite this article as: Yu Y, Shen H-S, Wang H, Hui D, Postbuckling of sandwich plates with graphene-reinforced composite face sheets in thermal environments, *Composites Part B* (2017), doi: 10.1016/j.compositesb.2017.09.045.

# Postbuckling of sandwich plates with graphene-reinforced composite face sheets in thermal environments

Yin Yu [1], Hui-Shen Shen [1,2,*], Hai Wang [1], D. Hui [3]

[1] School of Aeronautics and Astronautics, [2] School of Ocean and Civil Engineering, Shanghai Jiao Tong University, Shanghai 200240, People's Republic of China

[3]Department of Mechanical Engineering, University of New Orleans, New Orleans, LA 70148, USA

**Abstract**

Present investigation deals with the buckling and postbuckling behavior of a sandwich plate with a homogeneous core and graphene-reinforced composite (GRC) face sheets resting on an elastic foundation in thermal environments. The material properties of GRC face sheets are assumed to be piece-wise functionally graded by changing the volume fraction of graphene in the thickness direction. The material properties of both the homogeneous core layer and the GRC face sheets are assumed to be temperature-dependent, and are estimated by the extended Halpin-Tsaia micromechanical model. The higher order shear deformation plate theory and the von Kármán-type kinematic nonlinearity are used to derive the governing equations which account for the plate-foundation interaction and the thermal effects. The buckling loads and the postbuckling equilibrium paths are obtained by using a two-step perturbation technique. The impacts of the distribution type of reinforcements, core-to-face sheet thickness ratio, plate aspect ratio, temperature variation, foundation stiffness and in-plane boundary conditions on the postbuckling behavior of sandwich plates with functionally graded GRC face sheets are studied in detail.

*Key words*: A. Nano-structures; B. Buckling; C. Analytical modeling; Functionally graded materials

* Corresponding author. E-mail address: hsshen@sjtu.edu.cn (H.-S. Shen)