

# Author's Accepted Manuscript

Bending wrinkling and kink behaviors of inflated beam under local uniform loadings

C.G. Wang, M.X. Liu, J.T. Kang, Z.M. Xue, H.F. Tan



PII: S0020-7403(16)30919-5

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2016.11.026>

Reference: MS3505

To appear in: *International Journal of Mechanical Sciences*

Revised date: 18 November 2016

Accepted date: 26

Cite this article as: C.G. Wang, M.X. Liu, J.T. Kang, Z.M. Xue and H.F. Tan, Bending wrinkling and kink behaviors of inflated beam under local uniform loadings, *International Journal of Mechanical Sciences* <http://dx.doi.org/10.1016/j.ijmecsci.2016.11.026>

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 galley proof before it is published in its final citable 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

# Bending wrinkling and kink behaviors of inflated beam under local uniform loadings

C. G. Wang<sup>1</sup>, M. X. Liu<sup>2</sup>, J. T. Kang<sup>3</sup>, Z. M. Xue<sup>4</sup> and H. F. Tan.<sup>5</sup>

*Center for Composite Materials, Harbin Institute of Technology, Harbin, China, 150001*

## Abstract:

In this paper, analysis of the wrinkling and kink characteristics of the inflated beam under local uniform loadings is presented. Firstly the thin-walled beam modal, which is filled with uniform internal pressure, is established. Next the local uniform loads are applied on the beam. This introduces the load geometric parameters to the equations to predict the wrinkling characteristics. Then the kink, which is similar to a plastic hinge, is assumed to describe the invalid state of the inflated beam for the first time. In order to verify the assumptions of the kink and the theoretical predictions of the wrinkling and kink characteristics, the non-contact experimental tests are performed. Moreover, the theoretical and experimental results, which include the initial wrinkling and kink positions, the critical wrinkling and kink loads, the wrinkling strain, the length of the wrinkled region and the kink angle, are compared. The differences according to these comparisons are less than 10%, which means that the predicted results are reliable. In addition, the local uniform load position and its length as well as the edge shape and the middle cylinder length of the inflated beam can make great effects on the wrinkling and

---

<sup>1</sup> Prof., Center for Composite Materials, Harbin Institute of Technology/wangcg@hit.edu.cn, AIAA Member.

<sup>2</sup> Ph.D candidate, Center for Composite Materials, Harbin Institute of Technology/lmxyj0034@163.com.

<sup>3</sup> Ph.D candidate, Center for Composite Materials, Harbin Institute of Technology/kangjt@hit.edu.cn.

<sup>4</sup> Ph.D candidate, Center for Composite Materials, Harbin Institute of Technology/zmxue@hit.edu.cn.

<sup>5</sup> Prof., Center for Composite Materials, Harbin Institute of Technology/tanhf@hit.edu.cn. AIAA Member.

Download English Version:

<https://daneshyari.com/en/article/5016270>

Download Persian Version:

<https://daneshyari.com/article/5016270>

[Daneshyari.com](https://daneshyari.com)