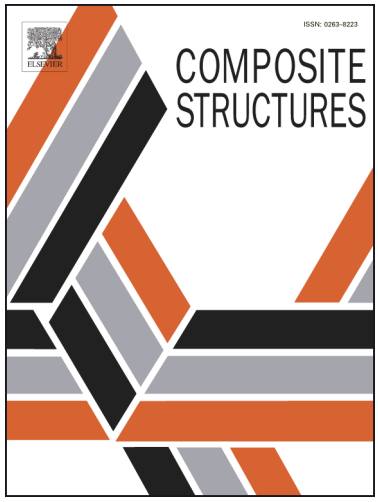
Accepted Manuscript



The second strain gradient functionally graded beam formulation

S.A. Momeni, M. Asghari

PII: S0263-8223(17)32351-6
DOI: https://doi.org/10.1016/j.compstruct.2017.12.046
Reference: COST 9203

To appear in: *Composite Structures*

Received Date: 27 July 2017
Revised Date: 13 December 2017
Accepted Date: 20 December 2017

Please cite this article as: Momeni, S.A., Asghari, M., The second strain gradient functionally graded beam formulation, *Composite Structures* (2017), doi: https://doi.org/10.1016/j.compstruct.2017.12.046

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

The second strain gradient functionally graded beam formulation

S. A. Momeni, M. Asghari*

Mechanical Engineering Department, Sharif University of Technology, Tehran, Iran

Abstract

A size-dependent formulation for the Euler-Bernoulli nano- and micr-beams made of functionally graded materials (FGMs) is presented. The formulation is developed on the basis of the second strain gradient theory (SSGT). This theory is a powerful non-classical continuum theory capable of capturing the small-scale effects in the mechanical behavior of small-scale structures. To drive the governing equations of motion along with the general form of boundary conditions, the Hamilton principle is utilized. Due to the inhomogeneity through the thickness of functionally graded beams, the two equations which govern the axial and flexural deformations are coupled. In two case studies with different boundary conditions, the system of coupled equations is analytically dealt with, and the size-dependent response of FG beams in free-vibration and static behavior is numerically investigated. This investigation shows a significant difference between results of SSG theory and other non-classical and classical theories for very thin beams.

Key words: The Second Strain Gradient Theory, functionally graded materials, small-scale structures, non-classical continuum theories

ACCEPTED MANUSCRIPT

1 .Introduction

Functionally graded materials (FGMs) are a class of inhomogeneous materials which their properties vary through some specific direction(s). This variation of properties can be regarded as a continuous function of position. FG materials are typically made of two different constituents, so that these materials would have advantages of both the constituents.

* Corresponding author. Email Address: asghari@ sharif.edu
Tel.: +98 21 66165523; fax: +98 21 66000021.

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
✓ امکان دانلود نسخه ترجمه شده مقالات
✓ پذیرش سفارش ترجمه تخصصی
✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
✓ دانلود فوری مقاله پس از پرداخت آنلاین
✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات