

عنوان مقاله:

Electro-Mechanical Buckling of a Piezoelectric Annular Plate Reinforced with BNNTs Under Thermal Environment

محل انتشار:

فصلنامه مکانیک جامد، دوره 3، شماره 4 (سال: 1390)

تعداد صفحات اصل مقاله: 13

نویسندگان:

A Ghorbanpour Arani - Faculty of Mechanical Engineering, University of Kashan--- Institute of Nanoscience & Nanotechnology, University of Kashan

E Haghparast - Faculty of Mechanical Engineering, University of Kashan

خلاصه مقاله:

In this article, axisymmetric buckling behavior of piezoelectric fiber reinforced polymeric composite (PFRPC) annular plate subjected to electro-thermo-mechanical field is presented utilizing principle of minimum potential energy. Boron-nitride nanotubes (BNNTs) are used as fibers. Full coupling between electrical, mechanical and thermal fields are considered according to a representative volume element (RVE)-based XY piezoelectric fiber reinforce composite (PEFRC) model. Assuming PFRPC material and its composite constituents to be linear, homogenous, orthotropic, and perfectly bonded with uniform applied field, the basic relation for the axisymmetric buckling of a circular plate subjected to radial compression, radial electrical field, and uniform temperature change are derived. The presented results show that BNNTs can be used as an effective supplement to improve mechanical behavior of polyvinylidene fluoride (PVDF). Also, at normal working conditions, the influence of thermal and mechanical fields is much higher than the electric one on the critical load; hence, this smart structure is best suited for applications as sensors than actuators.

کلمات کلیدی:

Axisymmetric buckling, BNNT, Annular Plate, Piezoelectric polymeric, Energy method, Electro-thermo-mechanical loadings

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1730608>

