عنوان مقاله:

A Modified Couple Stress Theory for Postbuckling Analysis of Timoshenko and Reddy-Levinson Single-Walled Carbon Nanobeams

محل انتشار:

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خلاصه مقاله:

The novelty of this study is presentation of an exact solution for prediction of postbuckling behavior of shear deformable micro- and nano-scale beams based on modified couple stress theory and using principle of minimum potential energy. Timoshenko and Reddy-Levinson beam theories are applied to consider the shear deformation effect and Von Karman nonlinear kinematics is used to describe the nonlinear behavior of the postbuckling, and the Poisson s effect is also considered in stress-strain relation. Also, the size effect is exposed by introducing a material length scale parameter. Finally, the influences of shear deformation, Poisson s ratio and variations of length and thickness are investigated. The results indicate that the classical theory exaggerates the postbuckling amplitude of the nanobeam and overstates the effect of shear deformation on the postbuckling response of the nanobeam.

کلمات کلیدی:

Postbuckling, Single-walled carbon nanobeam, Timoshenko and Reddy-Levinson beam theories