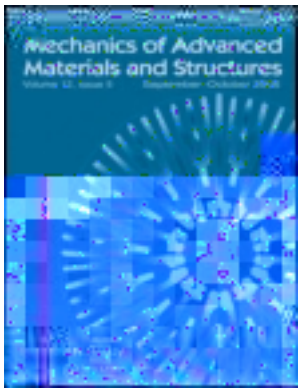

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Buckling of Functionally Graded Cylindrical Shells under Combined Loads

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Buckling of Functionally Graded Cylindrical Shells under Combined Loads

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By using the Rit energy method and nite element method, buckling behaviors of combined-loaded functionally graded cylindrical shells are investigated. The combined loads are composed of axial, lateral, and torsional loads. Results show that the contribution of lateral pressure to buckling is more signi cant than that of axial compression or torsion and the contributions of axial compression and torsion are almost the same. Also, a practical method is proposed in this article to determine the load-dominant bound

The strain energy of the gravity model is approximated to be

$$U = -\iiint_V (\quad$$

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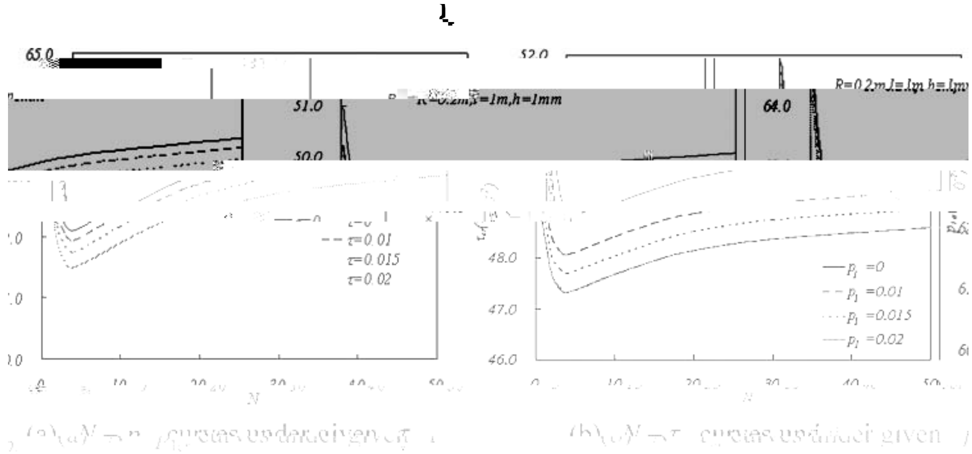
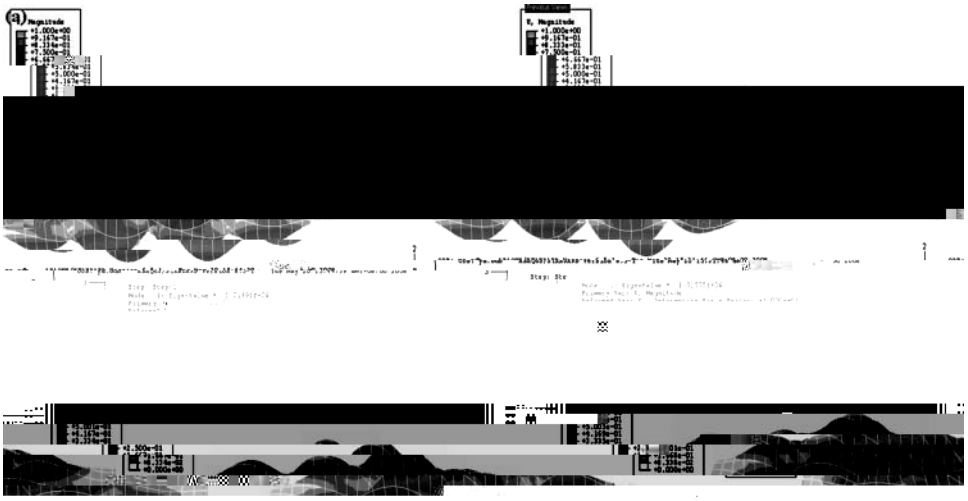


…ation curves of the critical parameters versus the power law exponent under

and decreases slightly with the increase of τ, and τ_{cr} decreases markedly with the increase of p

5. FEM RESULTS

FEM is one of the most effective methods to solve complicated engineering problems. It is also effective in solving eigenvalue problems of buckling. However, due to absence of ready material function in the existing FEM codes, it is difficult in simulating FGMs' material properties, which vary smoothly through the thickness. For this reason, there is still no precise modeling of FGMs by the FEM code in the literature. Some studies, with regard to three-dimensional elastic analysis by FEM code, were reported by Kang et al. [ ] and Wu [ ]. They regarded FGMs as a multi-layer material, and defined



uck, ng modes of s under ($N = , l = m, R = . m, h = mm$)

ded , gures e show xed buck, ng modes, roused by , nteg t on between x, ded nd tors on ded

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u-k, ng modes of s under ($N = \ , l = \ m, R = \ . \ m, h = \ mm$)

tors on ng e y en rges s the x , if f w e nu ber *m* under tel , nd tors on o ds re u ted, e , $m = \ $, there s no f ter to ister, ine the o dow, nt bounds fro, gure

gure shows ex e ent, gree ent between theore, re-su ts, nd resu ts λ x s, s, n the og r th, for t s re rk be th t, w th the, n re se of λ , there e rs,, n order, s ow, l , d, , nd then re-s ow e re se of P_{cr} h, s shows th t bu-k, ng of the stru-ture, s ore sens t e to tel o d th n to tors on o d, , nd the ure of λ n , ord-, ng y be d , ded, nto three d ffer nt reg ons, e , (, ×], (× , ×), , nd [× , $+\infty$), wh, h, orres ond res e t e y to , , ss, tel y- o ded bu-k, ng ode, ,