# Abstract


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### Joint Effect of the Nonlinearity of Elastic Foundations and the Variation of the Inertia Ratio on Buckling Behavior of Prismatic and Nonprismatic Columns Using a GDQ Method


In this paper, we present a simple, powerful, yet efficient and easily applicable technique based on the GDQ method for solving nonlinear problems. (e proposed technique is implemented to some nonlinear engineering problems in structure analysis. (e results reveal that the proposed technique is effective. (en, the proposed technique is used to explain the effects of the variation of cross section area on the nondimensional critical buckling loads for columns with and without elastic foundation for three sets of boundary conditions. Finally, the proposed technique is used to investigate the effect of the nonlinearity term of Winkler elastic foundation on the nondimensional critical buckling loads of nonuniform columns resting on elastic foundations. (e effectiveness of the proposed technique is validated through comparing the present results with exact solutions and other numerical results available in references. (e proposed method benefits the optimum design of columns against buckling in engineering applications. (e most important conclusions from this paper can be summarized as follows. When the inertia ratio varies parabolically, the nondimensional critical buckling loads increase in comparison with varying linearly. Moreover, the nondimensional critical buckling loads increase in the presence of the elastic foundation.