# THERMAL POSTBUCKLING OF HEATED UNIFORM COLUMNS CONSIDERING GREEN NONLINEARITY: A NOVEL LINEAR FINITE ELEMENT FORMULATION

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**Abstract**

Thermal postbuckling behavior of uniform, heated columns is presented, by using a novel linear Finite Element (FE) formulation. In this investigation, the general Green axial nonlinear strain- displacement relation is used, instead of the popularly used simpler von-Karman nonlinearity, which is a subset of Green nonlinearity. In the earlier complex nonlinear FE formulations, time consuming iterative or step-by-step methods are used to obtain the solution for thermal postbuckling. In the novel FE formulation, normally used FEs , for performing linear buckling analysis, is proposed to obtain thermal postbuckling loads. The nodal degrees of freedom are deflection and its first derivative with respect to the axial coordinate. The geometric nonlinearity is incorporated through the tensile loads induced, with axially restrained ends of the column, due to large deflections. The effectiveness of the novel FE formulation is demonstrated, from the numerical results obtained, in terms of the ratio of Thermal postbuckling to buckling loads, for specified reference deflection and slenderness ratios, of the columns with different boundary conditions. The numerical results reveal some interesting phenomena of thermal postbuckling behavior of columns.

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