

THERMAL POSTBUCKLING OF HEATED COLUMNS OF VARIABLE CROSS-SECTION - A SIMPLE INTUITIVE FORMULATION

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Abstract

The thermal postbuckling of heated slender columns of variable cross-section (tapered columns) is evaluated by a simple intuitive formulation, when compared to the popular Rayleigh-Ritz method. The intuitive formulation requires only two parameters, namely, the mechanical equivalent of the thermal buckling load parameter and the constant tensile load parameter induced in the column, due to moderately large deflections, when the ends of the column are fixed axially. The thermal buckling load parameter of tapered columns is obtained from the Rayleigh-Ritz method. The symmetric boundary conditions, like hinged-hinged and clamped-clamped conditions, are considered for the tapered columns, which are consistent with the symmetry of the tapered column. The ratio of thermal postbuckling to buckling loads obtained from the simple intuitive formulation, varying with the taper and central deflection ratios, are presented for hinged-hinged and clamped-clamped tapered columns, which match very well with those obtained by Rayleigh-Ritz method, which is a validation of the simple intuitive formulation.

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