Postbuckling Analysis of End Supported Rods under Self-Weight Using Intrinsic Coordinate Finite Elements

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Abstract : A formulation of postbuckling analysis of end supported rods under self-weight has been presented by the variational method. The variational formulation involving the strain energy due to bending and the potential energy of the self-weight, are expressed in terms of the intrinsic coordinates. The variational formulation is accomplished by introducing the Lagrange multiplier technique to impose the boundary conditions. The finite element method is used to derive a system of nonlinear equations resulting from the stationary of the total potential energy and then Newton-Raphson iterative procedure is applied to solve this system of equations. The numerical results demonstrate the postbluckled configurations of end supported rods under self-weight. This finite element method based on variational formulation expressed in term of intrinsic coordinate is highly recommended for postbuckling analysis of end-supported rods under self-weight.

Keywords : postbuckling, finite element method, variational method, intrinsic coordinate

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