

Non-Linear Analysis of Beams with Large deflections – An Interval Finite Element Approach

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Abstract

This work illustrates the development of Nonlinear Interval Finite Element Method for Euler-Bernouli Beams with large deflections under interval load. By including the von Karman strains (Reddy 2010), the secant stiffness is a function of the load. An interval load results in interval secant stiffness. Iterations using successively updated secant stiffness are used to obtain the large deflection solution.

In this paper, the formulation of non-linear interval secant solution strategy is presented. Several example problems will be solved using the developed method. The behavior of the solution is studied in terms of convergence, computational efficiency, and sharpness of interval bounds.

References

Reddy, J. N. *An Introduction to nonlinear finite element analysis*. Oxford University Press, 2010.