SEMI ANALYTICAL SOLUTION FOR A GEOMETRIC AND MATERIAL NONLINEARITY ON 2D TRUSSES

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Abstract

The analytical and semi-analytical results are important tools for approximate solutions' validation, however, for non-linear analyzes, these results are not calculated trivially. In turn, these results are not found in detail in the literature. Therefore, the main objective of this paper is presenting a semi-analytical solution for Von Mises-type plane trusses, showing the nodal behavior along the equilibrium, for both elastic and non-linear linear materials.

Comparisons are presented for the consideration of geometric non-linearity and geometric and material non-linearity. The obtained results were compared with routines implemented via MATLAB, adopting the Co-rotational approach for finite elements and using the Newton-Raphson method for the nonlinear system's solution.

Finally, we show the displacement paths of the monitored node in relation to the abscissa and coordinates axis, in addition, the variation of the resulting force applied in relation to the displacements in the main directions is plotted.

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