

Efficiency of the Strain Based Approach Formulation for Plate Bending Analysis

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Abstract : In recent years many finite elements have been developed for plate bending analysis. The formulated elements are based on the strain based approach. This approach leads to the representation of the displacements by higher order polynomial terms without the need for the introduction of additional internal and unnecessary degrees of freedom. Good convergence can also be obtained when the results are compared with those obtained from the corresponding displacement based elements, having the same total number of degrees of freedom. Furthermore, the plate bending elements are free from any shear locking since they converge to the Kirchhoff solution for thin plates contrarily for the corresponding displacement based elements. In this paper the efficiency of the strain based approach compared to well known displacement formulation is presented. The results obtained by a new formulated plate bending element based on the strain approach and Kirchhoff theory are compared with some others elements. The good convergence of the new formulated element is confirmed.

Keywords : displacement fields, finite elements, plate bending, Kirchhoff theory, strain based approach

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