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BUCKLING PROBLEMS OF MINDLIN PLATES BY ANALYTICAL QUADRILATERAL P-ELEMENTS

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ABSTRACT

An analytically integrated quadrilateral hierarchical finite element has been introduced by Leung and Zhu [1-2] to solve vibration problems of various structures. In their studies Legendre orthogonal polynomials are used as enriching shape functions to avoid the shear-locking problem. The elements are analytically integrated in closed form. This paper extends the quadrilateral *p*-elements to study the linear buckling problems of skew and trapezoidal Mindlin plates with various boundary conditions. It is found that the convergence of the quadrilateral *p*-elements is very fast with respect to the number of degrees of freedom. The resulting buckling loads of the Mindlin plates are in excellent agreement with those published [3-4]. The influence of the aspect ratio and the thickness on the buckling loading intensity factors of the Mindlin plates will be considered in this paper. New results for symmetrical trapezoidal plates subject to uniaxial compression on parallel or unparallel sides of the trapezoid are obtained. Buckling loads change monotonically with inclinations and aspect ratios for skew plates but not necessary so for trapezoidal plates.

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