An enhanced discrete Mindlin finite element model using a zigzag function

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Abstract

The present work deals with the formulation and the evaluation of a discrete finite element model for Reissner/Mindlin composite plates, including the introduction of zigzag form in order to improve plane and shear stress accuracy. The model is characterised by a piecewise linear variation of displacement, which allows to fulfil the stress continuity requirements. For this purpose, a new four-node quadrilateral enhanced finite element based on a quadratic displacement field is proposed. In the second version, it incorporates two additional zigzag terms and does not require shear correction. The element is validated across some known problems in the literature, highlighting the improvement of thickness stress distributions, by comparison with the initial model without zigzag function.