

# **Unsymmetric Mindlin-Reissner Plate/Shell Finite Elements Insensitive to Severe Mesh Distortion**

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## **Abstract**

The unsymmetric FEM is a very promising technique to produce finite elements with good numerical accuracies and high tolerances to mesh distortions. In this work, new high-performance unsymmetric quadrilateral Mindlin-Reissner plate/shell element models are developed within the framework of the so-called improved unsymmetric formulae, which is characterized by formulating the element's trial functions based on the analytical trial solutions of related problems and the general conforming theory. Extensive numerical tests reveal that these new plate/shell elements are free of shear locking, and exhibit excellent capabilities for predicting results of both displacement and stress. In particular, they can still work very well in severely distorted meshes even when the element shapes deteriorate into concave quadrangle or degenerated triangle.

**KEY WORDS:** unsymmetric FEM; analytical trial function; mesh distortion; Mindlin-Reissner