Moving Least Squares Meshfree Method for Linear Bending Analysis of Stiffened Symmetric Laminated Plates (Postprint)

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Abstract

Based on the first-order shear deformation theory, a moving least squares meshless method is proposed for solving linear bending problems of rectangular ribbed symmetric laminated plates. A ribbed laminated plate can be regarded as a composite structure composed of laminated plates and ribs. The displacement fields of the laminated plate and ribs are established separately using moving least squares approximation, the stiffness matrices of the laminated plate and ribs are derived, and then utilizing the displacement compatibility conditions between the plate and ribs, the stiffness matrix of the ribs is superimposed onto the stiffness matrix of the laminated plate to obtain the stiffness matrix of the entire composite structure. Since the meshless method based on moving least squares approximation does not satisfy the Kronecker condition, the full transformation method is employed to enforce essential boundary conditions. Numerical examples at the end of the paper analyze the bending performance of ribbed laminated plates under different numbers of ribs, lay-up configurations, elastic modulus ratios, and aspect ratios, and compare the solutions obtained by the present method with ABAQUS solutions, thereby verifying the validity and accuracy of the proposed method.

Full Text

Preamble

The preamble section of this document has been omitted due to extensive corruption of the source text. The original content contained numerous mathematical expressions marked by placeholders, but the surrounding Chinese academic text is not recoverable from the provided encoding.

Note: Figure translations are in progress. See original paper for figures.