Radial Point Interpolation Method for higher order composite strain gradient plate models

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Abstract

The present work investigates the problem of strain gradient laminated composites nano plates by considering Radial Point Interpolation Method (RPIM). Reference theory is the well-known thin-plate theory of Kirchhoff with the addition of higher-order derivatives due to the strain gradient model. Unlike the most common finite element method, meshless methods do not rely on a domain decomposition. In the present approach approximating polynomials at collocation nodes are obtained by using radial basis functions which depend on shape parameters. The selection of such parameters can strongly influence the accuracy of the numerical technique. Therefore, the authors are presenting some numerical benchmarks which involve the solution of nanoplates by employing an optimization approach for the evaluation of the undetermined shape parameters. Stability is discussed as well as numerical reliability against solutions taken for the existing literature.

Keywords: meshless; strain gradient; nanoplates; radial basis functions; composite laminates