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**The elastoplastic analysis of functionally graded materials using a meshfree RRKPM.**

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Summary: A meshfree approach, the radial basis reproducing kernel particle method (RRKPM), is proposed in this study, which is based on the radial basis functions (RBFs) and the reproducing kernel particle method (RKPM). The presented approach eliminates the negative effects of different kernel functions on numerical accuracy, which has the advantages of greater accuracy and convergence. Furthermore, the presented approach is adopted to solve the elastoplastic problem of functionally graded materials (FGMs). Using Galerkin weak form of elastoplastic problem, the meshfree RRKPM for elastoplastic problem of FGMs is established, and the penalty method is employed to impose the essential boundary conditions, then the corresponding formulas are obtained. The effects of the scaling factor, loading steps, number of nodes and node distributions on computational results of numerical accuracy are discussed in detail, and the influences of different functional gradient indexes on displacements are studied. To validate the applicability and reliability of the presented meshfree RRKPM, several elastoplastic examples of FGMs are performed and compared to the RKPM and the finite element method (FEM) solutions.

**MSC:**

74Sxx Numerical and other methods in solid mechanics
65Nxx Numerical methods for partial differential equations, boundary value problems
74Cxx Plastic materials, materials of stress-rate and internal-variable type



**Keywords:**

functionally graded materials; elastoplastic problem; meshfree approach; radial basis functions; reproducing kernel particle method

**Full Text:** DOI

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