

Weighted Finite Element Method for the Elasticity Problem with Singularity

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We consider the two-dimensional elasticity problem with a singularity caused by the presence of a reentrant corner on the domain boundary. For this problem, the notion of the R_ν -generalized solution is introduced and the corresponding definition is used to construct a scheme of the weighted finite-element method (FEM). The proposed method provides a first-order convergence of the approximate solution to the exact one with respect to the mesh step in the $\mathbf{W}_{2,\nu}^1(\Omega)$ -norm. The convergence rate does not depend on the size of the angle and kind of the boundary conditions imposed on its sides. This statement is illustrated by the results of numerical experiments. For the model problems, the dependence of the rate of convergence of the approximate solution to the exact R_ν -generalized solution with respect to the regularization parameters δ and ν is investigated.

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