

The finite element method for Dirichlet problem with strong singularity of solution on the boundary

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We consider the first-boundary-value problem for a non-self-adjoint second-order elliptic equation with coordinated degeneracy of input data whose solution has strong singularity on the curvilinear boundary of a two-dimensional convex domain. For this problem we define the solution as an R_ν -generalized one; we prove its existence and uniqueness in the Sobolev weighted space. We construct and investigate the finite element method for this problem. For that purpose the domain is divided quasi-uniformly into triangles. We introduce a finite element space which contains singular functions whose form depends on the space, to which the R_ν -generalized solution of the problem belongs. It was established that the approximation to the exact-generalized solution has first-order convergence in the norm of the Sobolev weighted space.

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