Dirichlet problem for elliptic equations of the second order in a singular domain of $\mathbf{R}^2$

by

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1. Introduction.

In this paper we treat the regularity of solutions of the Dirichlet problem for elliptic equations of the second order in a domain with edges.

In the case where the boundary of a domain is smooth, we know well the regularity of solutions of the Dirichlet problem.

T. Carleman [1] had studied the boundary value problem of the Laplace equation for a domain with edges. M. Š. Birman and G. E. Skvortsov [2] dealt with a kind of regularity of solutions of the Dirichlet problem in the case where the boundary of a bounded domain in R^2 consists of a finite number of three times continuously differentiable curves, which meet with the angles different from 0 or 2π.
V. A. Kondrat'ev [3] studied the general boundary value problem for a domain with conical or angular points in R^n.

We shall extend the result of M. Š. Birman and G. E. Skvortsov. Let Ω be a bounded domain in R^2 and let the boundary of Ω consist of a finite number of three times continuously differentiable curves, which may meet even with the angles 0 or 2π, but they have not contact of order ∞.

Consider an elliptic differential operator of the second order:

$$(1.1) \qquad Lu = - \sum_{i,j=1}^{2} a_{ij}(x) \frac{\partial^2 u}{\partial x_i \partial x_j} + \sum_{i=1}^{2} a_i(x) \frac{\partial u}{\partial x_i} + a(x)u$$