

Lavrentiev–Bitsadze equation in partially perforated domain

Gregory A. Chechkin

M.V. Lomonosov Moscow State University

`chechkin@mech.math.msu.su`

We consider the equation

$$-u_{yy}^\varepsilon - (\operatorname{sign} y) u_{xx}^\varepsilon = f(x, y)$$

in a semi-perforated domain D_ε , the perforated part of which is located in the half-plane $y > 0$ and has a locally periodic structure with a characteristic size ε , and the part lying in the lower half-plane $y < 0$ has a homogeneous structure. On the outer boundary of the domain, the homogeneous Dirichlet condition is imposed, while on the boundary of the cavities, a boundary condition of the third kind (Robin condition) is imposed with a parameter ε^α , responsible for energy dissipation. The asymptotic behavior of the solution is investigated as the small parameter ε tends to zero. We assume that $f \in C^1(\mathbb{R}^2)$ and vanishes when $y < 0$.

Three different cases are studied: $\alpha > 1$ (subcritical case), $\alpha = 1$ (critical case) and $\alpha < 1$ (supercritical case).