On a regular problem for an elliptic-parabolic equation with a potential boundary condition

Gaukhar AREPOVA

Institute of Mathematics and Mathematical Modeling, Kazakhstan
E-mail: arepovag@mail.ru

Abstract: In this paper we construct a lateral boundary condition for an elliptic-parabolic equation in a finite domain. Theorem on existence and uniqueness of the solution of the problem considered are proved by method of theory potential. For construction of problem we use the Bitsadze-Samarskii problem with boundary conditions.

Bitsadze-Samarskii conditions binds internal traces $u(x,0)$ and $\frac{\partial u}{\partial \tau}(x,0)$ with boundary conditions $u(x,t)$ and $\frac{\partial u}{\partial \tau}(x,t)$ on the boundary of the domain.

Theorem *For each*

$$f(x,t) \in C^{\alpha}(\overline{D^{-}}) \bigcap C^{\alpha}(\overline{D^{+}})$$

Bitsadze-Samarskii problem has a unique solution $u(x,t)$ *and*

$$u(x,t) \in C^{\alpha}(D) \bigcap C^{2+\alpha}(\overline{D^{-}}) \bigcap C^{2+\alpha,1+\alpha}_{x,t}(\overline{D^{+}}).$$

Throughout this note we mainly use techniques from our works [1-3].

Keywords: an elliptic-parabolic equation, Bitsadze-Samarskii problem, lateral boundary condition

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