

About one special boundary value problem for multidimensional parabolic integro-differential equation

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Abstract: In this paper we consider a special boundary value problem for multidimensional parabolic integro-differential equation with boundary conditions that contains as a boundary condition containing derivatives of order higher than the order of the equation [1,2,4]. The solution is sought in the form of a thermal potential of a double layer. Shows lemma of finding the limits of the derivatives of the unknown function in the neighborhood of the hyperplane. Using the boundary condition and lemma obtained integral-differential equation (IDE) of parabolic operators, where an unknown function under the integral contains higher-order space variables derivatives. IDE is reduced to a singular integral equation (SIE), when an unknown function in the spatial variables satisfies the Holder. The characteristic part is solved in the class of distribution function using method of transformation of Fourier-Laplace. Found an algebraic condition for the transition to the classical generalized solution. Integral equation of the resolvent for the characteristic part of SIE is obtained. Integro-differential equation is reduced to the Volterra-Fredholm type integral equation of the second kind by method of regularization. It is shown that the solution of SIE is a solution of IDE. Obtain a theorem on the solvability of the boundary value problem of multidimensional parabolic integro-differential equation, when a known function of the spatial variables belongs to the Holder class and satisfies the solvability conditions.

Keywords: Multidimensional parabolic integro-differential equation, singular integral equation, regularization

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