

An inverse problem of heat conduction in a degenerating domain

Muvasharkhan Jenaliyev¹, Madi Yergaliyev²

¹ *Institute of Mathematics and Mathematical Modeling, Kazakhstan*

muvasharkhan@gmail.com

² *Institute of Mathematics and Mathematical Modeling, Kazakhstan*

ergaliyev@math.kz

Abstract: This report is devoted to an inverse problem of finding a source parameter $\lambda(t)$ and $u(x, t)$ in following heat equation:

$$(1) \quad u_t(x, t) = u_{xx}(x, t) - \lambda(t)u(x, t), \quad 0 < x < t, t > 0,$$

with homogeneous initial condition

$$(2) \quad u(x, 0) = 0,$$

and the boundary condition

$$(3) \quad u(x, t)|_{x=0} = 0, \quad u(x, t)|_{x=t} = 0,$$

subject to the overspecification

$$(4) \quad \int_0^t u(x, t)dx = E(t), \quad E(0) = 0,$$

where the function $E(t)$ is given.

In this paper we found a nontrivial solution of the inverse problem for the heat equation in a degenerate domain that satisfies the integral condition (4) and found the lambda parameter. It was also shown that the found nontrivial solution is a bounded function for $\forall t > 0$.

Throughout this note we mainly use techniques from our works [1], [2].

Keywords: An inverse problem, heat equation, degenerating domain, integral condition.

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