

Problems of heat conduction with different boundary conditions in noncylindrical domains

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Abstract: In a degenerating domain $G = \{(x; t) : t > 0, 0 < x < t\}$ homogeneous problems for the heat equation with different boundary conditions are considered.

Problems with conditions one of which contains the time derivative are reduced to singular integral equations with incompressible kernel:

$$(1) \quad \varphi(t) - \int_0^t K(t, \tau) \varphi(\tau) d\tau = 0,$$

where

$$K(t, \tau) = \frac{1}{2a\sqrt{\pi}} \left\{ -\frac{t+\tau}{(t-\tau)^{\frac{3}{2}}} \exp\left(-\frac{(t+\tau)^2}{4a^2(t-\tau)}\right) + \frac{1}{(t-\tau)^{\frac{1}{2}}} \exp\left(-\frac{t-\tau}{4a^2}\right) \right\}.$$

It is shown that the norm of the integral operator in equation (1), acting in classes of continuous functions, is equal to 1.

The integral equation for other BVP is considered in [1]. Its solution was found in an explicit form. It is shown that the original homogeneous boundary value problems have nontrivial solutions in certain functional classes.

The research and writing of this work was carried out a grant from the Ministry of Science and Education of the Republic of Kazakhstan (Grant No. AP05132262).

Keywords: Volterra integral equation of the second kind, incompressibility of the kernel, degenerating domain

2010 Mathematics Subject Classification: 35D05, 35K20, 45C05, 45D05

REFERENCES

- [1] Jenaliyev, Muvasharkhan; Amangaliyeva, Meiramkul; Kosmakova, Minzilya; Ramazanov Murat. On a Volterra equation of the second kind with "incompressible" kernel, Advances in Difference Equations, 71, 14 p., 2015.