

Classical solvability of the first initial boundary value problem for super degenerate parabolic equation, *Ukr. Math. J.*, 56 № 10 (2004), 1299-1321 (N.V. Krasnoschek).

Abstract

Let $\Omega = (0, l)$, $\Omega_T = \Omega \times (0, T)$ and $\Sigma_T = \partial\Omega \times (0, T)$, in which $l, T > 0$. The paper studies the initial-boundary value problem

$$\begin{aligned}v_t(x, t) &= v^{1+s} v_{xx}(x, t) \text{ for } (x, t) \in \Omega_T, \\v(x, t) &= 0 \text{ for } (x, t) \in \Sigma_T, \\v(x, 0) &= v_0(x) \text{ for } x \in \Omega,\end{aligned}$$

with $s \in (0, 1)$. It is assumed that $v_0(x) > 0$, $v'_0(0) > 0$, $v'_0(l) < 0$. A function defined in Ω_T is said to be smooth if it belongs to some space of Sobolev type (a class of such spaces is introduced in Section 2 of the paper). The main theorem of the paper claims that for sufficiently smooth v_0 , the problem has the only smooth solution which is positive.