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The asymptotic behaviour of solutions $\varphi(x,t)$ of problem (1.6)-(1.8) is formulated in the Theorem 6.III. This theorem can be proved on the basis of the Tauber-type Theorem 6.I, and results about the Laplace transform of function $\varphi(x,t)$ and its derivatives, proved in Theorem 6.II. Here we give the proof of the first relation of (6.34). The other relations (6.34)-(6.37) can be proved in a similar way.

We denote by $\widehat{\varphi}(z,x)$ the Laplace transform of the function $\varphi(x,t)$. This function satisfies the equation (6.18) and can be given by the formula (6.21). In order to apply the Tauber-type theorem, we have to prove the relation

$$\lim_{z \to 0} z^{\mu}\, \widehat{\varphi}(z,x) = 0$$

for some real constant μ. Using asymptotic formulas for $c_1(z)$, $c_2(z)$, $\omega_1(z)$, $\omega_2(z)$, $A_1(z)$, $A_2(z)$ and hypotheses $\mathcal{H}_0$), $\mathcal{H}_1$), $\mathcal{H}_2$), we can find that $\mu = 1 + \varepsilon$, where ε is arbitrary positive number.

From the Tauber-type theorem (see (6.4)) it follows that

$$\lim_{t \to \infty} \frac{\varphi(x,t)}{t^{\mu - 1}} = 0 \quad \text{or} \quad \lim_{t \to \infty} \frac{\varphi(x,t)}{t^{\varepsilon}} = 0$$

for any $\varepsilon > 0$. It means that the first relation in (6.34) is valid.

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