3. $\dfrac{\partial^2 w}{\partial t^2} = \dfrac{\partial}{\partial x}\left(ae^{\lambda w}\dfrac{\partial w}{\partial x}\right), \qquad a > 0.$

1°. Additive separable solutions:

$$w(x,t) = \frac{1}{\lambda}\ln|Ax+B| + Ct + D,$$
$$w(x,t) = \frac{2}{\lambda}\ln|Ax+B| - \frac{2}{\lambda}\ln|\pm A\sqrt{a}\,t + C|,$$
$$w(x,t) = \frac{1}{\lambda}\ln(aA^2x^2 + Bx + C) - \frac{2}{\lambda}\ln(aAt + D),$$
$$w(x,t) = \frac{1}{\lambda}\ln(Ax^2 + Bx + C) + \frac{1}{\lambda}\ln\left[\frac{p^2}{aA\cos^2(pt+q)}\right],$$
$$w(x,t) = \frac{1}{\lambda}\ln(Ax^2 + Bx + C) + \frac{1}{\lambda}\ln\left[\frac{p^2}{aA\sinh^2(pt+q)}\right],$$
$$w(x,t) = \frac{1}{\lambda}\ln(Ax^2 + Bx + C) + \frac{1}{\lambda}\ln\left[\frac{-p^2}{aA\cosh^2(pt+q)}\right],$$

where A, B, C, D, p, and q are arbitrary constants.

3°. There are solutions of the following forms:

$$w(x,t) = F(z), \quad z = kx + \beta t \qquad \text{traviling-wave solution;}$$
$$w(x,t) = G(\xi), \quad \xi = x/t \qquad \text{self-similar solution;}$$
$$w(x,t) = H(\eta) + 2(k-1)\lambda^{-1}\ln t, \quad \eta = xt^{-k};$$
$$w(x,t) = U(\zeta) - 2\lambda^{-1}\ln|t|, \quad \zeta = x + k\ln|t|;$$
$$w(x,t) = V(\zeta) - 2\lambda^{-1}t, \quad \eta = xe^{t},$$

where k and β is an arbitrary constant.

References

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