**2.** $\dfrac{\partial^2 u}{\partial t^2} = \dfrac{a}{x^n}\dfrac{\partial}{\partial x}\left(x^n\dfrac{\partial u}{\partial x}\right) + e^{\lambda u} f(\lambda u - \sigma w), \quad \dfrac{\partial^2 w}{\partial t^2} = \dfrac{b}{x^n}\dfrac{\partial}{\partial x}\left(x^n\dfrac{\partial w}{\partial x}\right) + e^{\sigma w} g(\lambda u - \sigma w).$

1°. Solution:

$$u = y(\xi) - \frac{2}{\lambda}\ln(C_1 t + C_2), \qquad w = z(\xi) - \frac{2}{\sigma}\ln(C_1 t + C_2), \qquad \xi = \frac{x}{C_1 t + C_2},$$

where $C_1$ and $C_2$ are arbitrary constants, and the functions $y = y(\xi)$ and $z = z(\xi)$ are determined by the system of ordinary differential equations

$$C_1^2(\xi^2 y'_\xi)'_\xi + 2C_1^2\lambda^{-1} = a\xi^{-n}(\xi^n y'_\xi)'_\xi + e^{\lambda y} f(\lambda y - \sigma z),$$
$$C_1^2(\xi^2 z'_\xi)'_\xi + 2C_1^2\sigma^{-1} = b\xi^{-n}(\xi^n z'_\xi)'_\xi + e^{\sigma z} g(\lambda y - \sigma z).$$

2°. Solution with $b = a$:

$$u = \theta(x,t), \qquad w = \frac{\lambda}{\sigma}\theta(x,t) - \frac{k}{\sigma},$$

where $k$ is a root of the algebraic (transcendental) equation

$$\lambda f(k) = \sigma e^{-k} g(k),$$

and the function $\theta = \theta(x,t)$ satisfies the equation

$$\frac{\partial^2 \theta}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n\frac{\partial \theta}{\partial x}\right) + f(k)e^{\lambda\theta}.$$

This equation is solvable at $n = 0$. For its exact solutions, see the “Handbook of Nonlinear Partial Differential Equations” by A. D. Polyanin & V. F. Zaitsev (2004).

 