**4.** $$\frac{\partial u}{\partial t} = L[u] + uf\left(\frac{u}{w}\right) + g\left(\frac{u}{w}\right), \qquad \frac{\partial w}{\partial t} = L[w] + wf\left(\frac{u}{w}\right) + h\left(\frac{u}{w}\right).$$

Here, $L$ is an arbitrary linear differential operator (of any order) in the coordinates $x_1, \dots, x_n$, whose coefficients can depend on $x_1, \dots, x_n, t$. It is assumed that $L[\text{const}] = 0$.

Let $k$ be a root of the algebraic (transcendental) equation

$$g(k) = kh(k). \tag{1}$$

1°. Solution if $f(k) \neq 0$:

$$u = k\left(\exp[f(k)t]\theta(x_1, \dots, x_n, t) - \frac{h(k)}{f(k)}\right), \quad w = \exp[f(k)t]\theta(x_1, \dots, x_n, t) - \frac{h(k)}{f(k)},$$

where the function $\theta = \theta(x_1, \dots, x_n, t)$ satisfies the linear equation

$$\frac{\partial \theta}{\partial t} = L[\theta]. \tag{2}$$

2°. Solution if $f(k) = 0$:

$$u = k[\theta(x_1, \dots, x_n, t) + h(k)t], \quad w = \theta(x_1, \dots, x_n, t) + h(k)t,$$

where the function $\theta = \theta(x_1, \dots, x_n, t)$ satisfies the linear equation (2).

 