20. $$\frac{\partial u}{\partial t} = a\frac{\partial^2 u}{\partial x^2} + uf\left(u^2 - w^2\right) + wg\left(u^2 - w^2\right) + w\,\mathrm{arctanh}\left(\frac{w}{u}\right)h\left(u^2 - w^2\right),$$
$$\frac{\partial w}{\partial t} = a\frac{\partial^2 w}{\partial x^2} + wf\left(u^2 - w^2\right) + ug\left(u^2 - w^2\right) + u\,\mathrm{arctanh}\left(\frac{w}{u}\right)h\left(u^2 - w^2\right).$$

Functional separable solution:

$$u = r(t)\cosh\left[\varphi(t)x + \psi(t)\right], \quad w = r(t)\sinh\left[\varphi(t)x + \psi(t)\right],$$

where the functions $r = r(t)$, $\varphi = \varphi(t)$, and $\psi = \psi(t)$ are determined by the system of ordinary differential equations

$$r'_t = ar\varphi^2 + rf(r^2),$$
$$\varphi'_t = h(r^2)\varphi,$$
$$\psi'_t = h(r^2)\psi + g(r^2).$$

Reference

Polyanin, A. D., Exact solutions of nonlinear systems of reaction-diffusion equations and mathematical biology equations, *Theor. Found. Chem. Eng.*, Vol. 37, No. 6, 2004.

