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

Functional separable solution (for fixed t, it defines a structure periodic in x with phase shift in components):
$$u = r(t)\cos\bigl[\varphi(t)x+\psi(t)\bigr],\quad w = r(t)\sin\bigl[\varphi(t)x+\psi(t)\bigr],$$
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.