4. Нелинейные системы двух дифференциальных уравнений в частных производных гиперболического типа

1. $$\frac{\partial^2 u}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial x}\right) + uf(bu - cw) + g(bu - cw),$$
$$\frac{\partial^2 w}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial w}{\partial x}\right) + wf(bu - cw) + h(bu - cw).$$

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

3. $$\frac{\partial^2 u}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial x}\right) + uf\left(\frac{u}{w}\right), \quad \frac{\partial^2 w}{\partial t^2} = \frac{b}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial w}{\partial x}\right) + wg\left(\frac{u}{w}\right).$$

4. $$\frac{\partial^2 u}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial x}\right) + uf\left(\frac{u}{w}\right) + \frac{u}{w}h\left(\frac{u}{w}\right),$$
$$\frac{\partial^2 w}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial w}\right) + wg\left(\frac{u}{w}\right) + h\left(\frac{u}{w}\right).$$

5. $$\frac{\partial^2 u}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial x}\right) + u^k f\left(\frac{u}{w}\right), \quad \frac{\partial^2 w}{\partial t^2} = \frac{b}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial w}{\partial x}\right) + w^k g\left(\frac{u}{w}\right).$$

6. $$\frac{\partial^2 u}{\partial t^2} = \frac{a}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial u}{\partial x}\right) + uf(x, u^k w^m),$$
$$\frac{\partial^2 w}{\partial t^2} = \frac{b}{x^n}\frac{\partial}{\partial x}\left(x^n \frac{\partial w}{\partial x}\right) + wg(x, u^k w^m).$$

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

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