2. $i\dfrac{\partial w}{\partial t}+\dfrac{\partial^2 w}{\partial x^2}+A|w|^{2n}w=0.$

Schrodinger (Schrödinger) equation with a power-law nonlinearity. Here, w is a complex functions of real variables x and t; A and n are real numbers, $i^2=-1$.

1°. Solutions:

$$w(x,t)=C_1\exp\bigl\{i\,[C_2x+(A|C_1|^{2n}-C_2^2)t+C_3]\bigr\},$$

$$w(x,t)=\pm\left[\frac{(n+1)C_1^2}{A\cosh^2(C_1nx+C_2)}\right]^{\frac{1}{2n}}\exp[i(C_1^2t+C_3)],$$

$$w(x,t)=\frac{C_1}{\sqrt{t}}\exp\left[i\frac{(x+C_2)^2}{4t}+i\left(\frac{AC_1^{2n}}{1-n}t^{1-n}+C_3\right)\right],$$

where C_1, C_2, and C_3 are arbitrary real constants.

2°. There is a self-similar solution of the form $w=t^{-1/(2n)}u(\xi)$, where $\xi=xt^{-1/2}$.

3°. For other exact solutions, see the nonlinear Schrodinger equation of general form with $f(u)=Au^{2n}$.

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