Target equation:

$-ia_1u^{(1,0)}(x,t) + a_2u^{(2,0)}(x,t) - ia_3u^{(3,0)}(x,t) + a_4u^{(4,0)}(x,t) - ia_5u^{(5,0)}(x,t) + a_6u^{(6,0)}(x,t) - bu(x,t)\left|u(x,t)\right|^2 + iu^{(0,1)}(x,t) = 0$

Substitutions:

$$\mathrm{N} = 3$$

$$u(x,t) \to y(z)e^{i(kx-\omega t)}$$

$$z \to x - \mathrm{C0}t$$

$$y(z) \to AR(z)^3$$

$$R'(z)^2 = R(z)^2\left(1 - \chi R(z)^2\right)$$

Imaginary part of equation after substitutions:

$y'(z)\left(a_1 - 2a_2k - 3a_3k^2 + 4a_4k^3 + 5a_5k^4 - 6a_6k^5 - \mathrm{C0}\right) + y^{(3)}(z)\left(a_3 - 4a_4k - 10a_5k^2 + 20a_6k^3\right) +$

$y^{(5)}(z)(a_5 - 6a_6k) = 0$

Real part of equation after substitutions:

$y(z)\left(a_1k - a_2k^2 - a_3k^3 + a_4k^4 + a_5k^5 - a_6k^6 + \omega\right) + y''(z)\left(a_2 + 3a_3k - 6a_4k^2 - 10a_5k^3 + 15a_6k^4\right) +$

$a_4y^{(4)}(z) + 5a_5ky^{(4)}(z) - 15a_6k^2y^{(4)}(z) + a_6y^{(6)}(z) - by(z)^3 = 0$

Constraints on coefficients from imaginary part of equation:

$a_5 \to 6a_6k$

$a_3 \to 4\left(a_4k + 10a_6k^3\right)$

$\mathrm{C0} \to a_1 - 2a_2k - 8a_4k^3 - 96a_6k^5$

Constraints on coefficients from real part of equation:

$b \to -\frac{20160a_6\chi^3}{A^2}$

$a_4 \to -a_6\left(15k^2 + 83\right)$

$a_2 \to 15a_6k^4 + 498a_6k^2 + 1891a_6$

$\omega \to -a_1k + 5a_6k^6 + 249a_6k^4 + 1891a_6k^2 - 11025a_6$

y(z) - function:

$$\frac{64a^3A}{\left(4a^2e^z + \chi e^{-z}\right)^3}$$

u(x, t) - function:

$$\frac{64a^3Ae^{i(kx-\omega t)}}{\left(4a^2e^{\mathrm{C0}t+x} + \chi e^{-\mathrm{C0}t-x}\right)^3}$$