

Target equation:

$$-ia1u^{(1,0)}(x,t) + a2u^{(2,0)}(x,t) - ia3u^{(3,0)}(x,t) + a4u^{(4,0)}(x,t) - ia5u^{(5,0)}(x,t) + a6u^{(6,0)}(x,t) - bu(x,t)|u(x,t)|^2 + iu^{(0,1)}(x,t) = 0$$

Substitutions:

$$N = 3$$

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

$$z \rightarrow x - C0t$$

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

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

Imaginary part of equation after substitutions:

$$y'(z)(a1 - 2a2k - 3a3k^2 + 4a4k^3 + 5a5k^4 - 6a6k^5 - C0) + y^{(3)}(z)(a3 - 4a4k - 10a5k^2 + 20a6k^3) + y^{(5)}(z)(a5 - 6a6k) = 0$$

Real part of equation after substitutions:

$$y(z)(a1k - a2k^2 - a3k^3 + a4k^4 + a5k^5 - a6k^6 + \omega) + y''(z)(a2 + 3a3k - 6a4k^2 - 10a5k^3 + 15a6k^4) + a4y^{(4)}(z) + 5a5ky^{(4)}(z) - 15a6k^2y^{(4)}(z) + a6y^{(6)}(z) - by(z)^3 = 0$$

Constraints on coefficients from imaginary part of equation:

$$a5 \rightarrow 6a6k$$

$$a3 \rightarrow 4(a4k + 10a6k^3)$$

$$C0 \rightarrow a1 - 2a2k - 8a4k^3 - 96a6k^5$$

Constraints on coefficients from real part of equation:

$$b \rightarrow -\frac{20160a6\chi^3}{A^2}$$

$$a4 \rightarrow -a6(15k^2 + 83)$$

$$a2 \rightarrow 15a6k^4 + 498a6k^2 + 1891a6$$

$$\omega \rightarrow -a1k + 5a6k^6 + 249a6k^4 + 1891a6k^2 - 11025a6$$

y(z) - function:

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

u(x, t) - function:

$$\frac{64a^3Ae^{i(kx-\omega t)}}{(4a^2e^{C0t+x} + \chi e^{-C0t-x})^3}$$