Target equation:

$$-ia_1u^{(1,0)}(x,t)+a_{10}u^{(10,0)}(x,t)-ia_{11}u^{(11,0)}(x,t)+a_{12}u^{(12,0)}(x,t)-ia_{13}u^{(13,0)}(x,t)+a_{14}u^{(14,0)}(x,t)-$$
$$ia_{15}u^{(15,0)}(x,t)+a_{16}u^{(16,0)}(x,t)-ia_{17}u^{(17,0)}(x,t)+a_{18}u^{(18,0)}(x,t)-ia_{19}u^{(19,0)}(x,t)+a_2u^{(2,0)}(x,t)+$$
$$a_{20}u^{(20,0)}(x,t)-ia_{21}u^{(21,0)}(x,t)+a_{22}u^{(22,0)}(x,t)-ia_3u^{(3,0)}(x,t)+a_4u^{(4,0)}(x,t)-ia_5u^{(5,0)}(x,t)+$$
$$a_6u^{(6,0)}(x,t)-ia_7u^{(7,0)}(x,t)+a_8u^{(8,0)}(x,t)-ia_9u^{(9,0)}(x,t)-bu(x,t)\left|u(x,t)\right|^2+iu^{(0,1)}(x,t)=0$$

Substitutions:

$$\mathrm{N}=11$$
$$u(x,t)\to y(z)e^{i(kx-\omega t)}$$
$$z\to x-\mathrm{C0}t$$
$$y(z)\to AR(z)^{11}$$
$$R'(z)^2=R(z)^2\left(1-\chi R(z)^2\right)$$

Imaginary part of equation after substitutions:

$$-26334a_{22}y^{(5)}(z)k^{17}+20349a_{21}y^{(5)}(z)k^{16}+15504a_{20}y^{(5)}(z)k^{15}+170544a_{22}y^{(7)}(z)k^{15}-11628a_{19}y^{(5)}(z)k^{14}-$$
$$116280a_{21}y^{(7)}(z)k^{14}-8568a_{18}y^{(5)}(z)k^{13}-77520a_{20}y^{(7)}(z)k^{13}-497420a_{22}y^{(9)}(z)k^{13}+6188a_{17}y^{(5)}(z)k^{12}+$$
$$50388a_{19}y^{(7)}(z)k^{12}+293930a_{21}y^{(9)}(z)k^{12}+4368a_{16}y^{(5)}(z)k^{11}+31824a_{18}y^{(7)}(z)k^{11}+167960a_{20}y^{(9)}(z)k^{11}+$$
$$705432a_{22}y^{(11)}(z)k^{11}-3003a_{15}y^{(5)}(z)k^{10}-19448a_{17}y^{(7)}(z)k^{10}-92378a_{19}y^{(9)}(z)k^{10}-352716a_{21}y^{(11)}(z)k^{10}-$$
$$2002a_{14}y^{(5)}(z)k^9-11440a_{16}y^{(7)}(z)k^9-48620a_{18}y^{(9)}(z)k^9-167960a_{20}y^{(11)}(z)k^9-497420a_{22}y^{(13)}(z)k^9+$$
$$1287a_{13}y^{(5)}(z)k^8+6435a_{15}y^{(7)}(z)k^8+24310a_{17}y^{(9)}(z)k^8+75582a_{19}y^{(11)}(z)k^8+203490a_{21}y^{(13)}(z)k^8+$$
$$792a_{12}y^{(5)}(z)k^7+3432a_{14}y^{(7)}(z)k^7+11440a_{16}y^{(9)}(z)k^7+31824a_{18}y^{(11)}(z)k^7+77520a_{20}y^{(13)}(z)k^7+$$
$$170544a_{22}y^{(15)}(z)k^7-462a_{11}y^{(5)}(z)k^6-1716a_{13}y^{(7)}(z)k^6-5005a_{15}y^{(9)}(z)k^6-12376a_{17}y^{(11)}(z)k^6-$$
$$27132a_{19}y^{(13)}(z)k^6-54264a_{21}y^{(15)}(z)k^6-252a_{10}y^{(5)}(z)k^5-792a_{12}y^{(7)}(z)k^5-2002a_{14}y^{(9)}(z)k^5-$$
$$4368a_{16}y^{(11)}(z)k^5-8568a_{18}y^{(13)}(z)k^5-15504a_{20}y^{(15)}(z)k^5-26334a_{22}y^{(17)}(z)k^5+126a_9y^{(5)}(z)k^4+$$
$$330a_{11}y^{(7)}(z)k^4+715a_{13}y^{(9)}(z)k^4+1365a_{15}y^{(11)}(z)k^4+2380a_{17}y^{(13)}(z)k^4+3876a_{19}y^{(15)}(z)k^4+$$
$$5985a_{21}y^{(17)}(z)k^4+56a_8y^{(5)}(z)k^3+120a_{10}y^{(7)}(z)k^3+220a_{12}y^{(9)}(z)k^3+364a_{14}y^{(11)}(z)k^3+560a_{16}y^{(13)}(z)k^3+$$
$$816a_{18}y^{(15)}(z)k^3+1140a_{20}y^{(17)}(z)k^3+1540a_{22}y^{(19)}(z)k^3-21a_7y^{(5)}(z)k^2-36a_9y^{(7)}(z)k^2-55a_{11}y^{(9)}(z)k^2-$$
$$78a_{13}y^{(11)}(z)k^2-105a_{15}y^{(13)}(z)k^2-136a_{17}y^{(15)}(z)k^2-171a_{19}y^{(17)}(z)k^2-210a_{21}y^{(19)}(z)k^2-$$
$$6a_6y^{(5)}(z)k-8a_8y^{(7)}(z)k-10a_{10}y^{(9)}(z)k-12a_{12}y^{(11)}(z)k-14a_{14}y^{(13)}(z)k-16a_{16}y^{(15)}(z)k-$$
$$18a_{18}y^{(17)}(z)k-20a_{20}y^{(19)}(z)k-22a_{22}y^{(21)}(z)k+(a_1-\mathrm{C0}+k\,(k\,(k\,(4a_4+k\,(5a_5+k\,(k\,(k\,(8a_8+k\,(9a_9+k\,($$
$$(a_3+k\,(k\,(k\,(20a_6+k\,(35a_7+k\,(k\,(k\,(120a_{10}+k\,(165a_{11}+k\,(k\,(1540a_{22}k^9-1330a_{21}k^8-1140a_{20}k^7+969$$
$$a_5y^{(5)}(z)+a_7y^{(7)}(z)+a_9y^{(9)}(z)+a_{11}y^{(11)}(z)+a_{13}y^{(13)}(z)+a_{15}y^{(15)}(z)+a_{17}y^{(17)}(z)+a_{19}y^{(19)}(z)+$$
$$a_{21}y^{(21)}(z)=0$$

Real part of equation after substitutions:

$$-7315a_{22}y^{(4)}(z)k^{18}+5985a_{21}y^{(4)}(z)k^{17}+4845a_{20}y^{(4)}(z)k^{16}+74613a_{22}y^{(6)}(z)k^{16}-3876a_{19}y^{(4)}(z)k^{15}-$$
$$54264a_{21}y^{(6)}(z)k^{15}-3060a_{18}y^{(4)}(z)k^{14}-38760a_{20}y^{(6)}(z)k^{14}-319770a_{22}y^{(8)}(z)k^{14}+2380a_{17}y^{(4)}(z)k^{13}+$$

$27132a_{19}y^{(6)}(z)k^{13}+203490a_{21}y^{(8)}(z)k^{13}+1820a_{16}y^{(4)}(z)k^{12}+18564a_{18}y^{(6)}(z)k^{12}+125970a_{20}y^{(8)}(z)k^{12}+$
$646646a_{22}y^{(10)}(z)k^{12}-1365a_{15}y^{(4)}(z)k^{11}-12376a_{17}y^{(6)}(z)k^{11}-75582a_{19}y^{(8)}(z)k^{11}-352716a_{21}y^{(10)}(z)k^{11}-$
$1001a_{14}y^{(4)}(z)k^{10}-8008a_{16}y^{(6)}(z)k^{10}-43758a_{18}y^{(8)}(z)k^{10}-184756a_{20}y^{(10)}(z)k^{10}-646646a_{22}y^{(12)}(z)k^{10}+$
$715a_{13}y^{(4)}(z)k^{9}+5005a_{15}y^{(6)}(z)k^{9}+24310a_{17}y^{(8)}(z)k^{9}+92378a_{19}y^{(10)}(z)k^{9}+293930a_{21}y^{(12)}(z)k^{9}+$
$495a_{12}y^{(4)}(z)k^{8}+3003a_{14}y^{(6)}(z)k^{8}+12870a_{16}y^{(8)}(z)k^{8}+43758a_{18}y^{(10)}(z)k^{8}+125970a_{20}y^{(12)}(z)k^{8}+$
$319770a_{22}y^{(14)}(z)k^{8}-330a_{11}y^{(4)}(z)k^{7}-1716a_{13}y^{(6)}(z)k^{7}-6435a_{15}y^{(8)}(z)k^{7}-19448a_{17}y^{(10)}(z)k^{7}-$
$50388a_{19}y^{(12)}(z)k^{7}-116280a_{21}y^{(14)}(z)k^{7}-210a_{10}y^{(4)}(z)k^{6}-924a_{12}y^{(6)}(z)k^{6}-3003a_{14}y^{(8)}(z)k^{6}-$
$8008a_{16}y^{(10)}(z)k^{6}-18564a_{18}y^{(12)}(z)k^{6}-38760a_{20}y^{(14)}(z)k^{6}-74613a_{22}y^{(16)}(z)k^{6}+126a_{9}y^{(4)}(z)k^{5}+$
$462a_{11}y^{(6)}(z)k^{5}+1287a_{13}y^{(8)}(z)k^{5}+3003a_{15}y^{(10)}(z)k^{5}+6188a_{17}y^{(12)}(z)k^{5}+11628a_{19}y^{(14)}(z)k^{5}+$
$20349a_{21}y^{(16)}(z)k^{5}+70a_{8}y^{(4)}(z)k^{4}+210a_{10}y^{(6)}(z)k^{4}+495a_{12}y^{(8)}(z)k^{4}+1001a_{14}y^{(10)}(z)k^{4}+$
$1820a_{16}y^{(12)}(z)k^{4}+3060a_{18}y^{(14)}(z)k^{4}+4845a_{20}y^{(16)}(z)k^{4}+7315a_{22}y^{(18)}(z)k^{4}-35a_{7}y^{(4)}(z)k^{3}-$
$84a_{9}y^{(6)}(z)k^{3}-165a_{11}y^{(8)}(z)k^{3}-286a_{13}y^{(10)}(z)k^{3}-455a_{15}y^{(12)}(z)k^{3}-680a_{17}y^{(14)}(z)k^{3}-969a_{19}y^{(16)}(z)k^{3}-$
$1330a_{21}y^{(18)}(z)k^{3}-15a_{6}y^{(4)}(z)k^{2}-28a_{8}y^{(6)}(z)k^{2}-45a_{10}y^{(8)}(z)k^{2}-66a_{12}y^{(10)}(z)k^{2}-91a_{14}y^{(12)}(z)k^{2}-$
$120a_{16}y^{(14)}(z)k^{2}-153a_{18}y^{(16)}(z)k^{2}-190a_{20}y^{(18)}(z)k^{2}-231a_{22}y^{(20)}(z)k^{2}+5a_{5}y^{(4)}(z)k+7a_{7}y^{(6)}(z)k+$
$9a_{9}y^{(8)}(z)k+11a_{11}y^{(10)}(z)k+13a_{13}y^{(12)}(z)k+15a_{15}y^{(14)}(z)k+17a_{17}y^{(16)}(z)k+19a_{19}y^{(18)}(z)k+$
$21a_{21}y^{(20)}(z)k-by(z)^3+(-a_{22}k^{22}+a_{21}k^{21}+a_{20}k^{20}-a_{19}k^{19}-a_{18}k^{18}+a_{17}k^{17}+a_{16}k^{16}-a_{15}k^{15}-a_{14}k^{14}+$
$(a_2+k\,(3a_3+k\,(k\,(15a_6+k\,(21a_7+k\,(k\,(k\,(45a_{10}+k\,(55a_{11}+k\,(k\,(231a_{22}k^9-210a_{21}k^8-190a_{20}k^7+$
$a_4y^{(4)}(z)+a_6y^{(6)}(z)+a_8y^{(8)}(z)+a_{10}y^{(10)}(z)+a_{12}y^{(12)}(z)+a_{14}y^{(14)}(z)+a_{16}y^{(16)}(z)+a_{18}y^{(18)}(z)+$
$a_{20}y^{(20)}(z)+a_{22}y^{(22)}(z)=0$

Constraints on coefficients from imaginary part of equation:

$a_{21}\to 22a_{22}k$

$a_{19}\to 20a_{20}k+3080a_{22}k^3$

$a_{17}\to 18a_{18}k+2280a_{20}k^3+421344a_{22}k^5$

$a_{15}\to 16a_{16}k+1632a_{18}k^3+248064a_{20}k^5+46387968a_{22}k^7$

$a_{13}\to 14a_{14}k+1120a_{16}k^3+137088a_{18}k^5+21085440a_{20}k^7+3947525120a_{22}k^9$

$a_{11}\to 12a_{12}k+728a_{14}k^3+69888a_{16}k^5+8656128a_{18}k^7+1332930560a_{20}k^9+249576198144a_{22}k^{11}$

$a_9\to 10a_{10}k+440a_{12}k^3+32032a_{14}k^5+3111680a_{16}k^7+385848320a_{18}k^9+59422904320a_{20}k^{11}+$
$11126417899520a_{22}k^{13}$

$a_7\to 240a_{10}k^3+12672a_{12}k^5+933504a_{14}k^7+90787840a_{16}k^9+11259076608a_{18}k^{11}+1733987205120a_{20}k^{13}+$
$324674387017728a_{22}k^{15}+8a_8k$

$a_5\to 4032a_{10}k^5+215424a_{12}k^7+15887872a_{14}k^9+1545363456a_{16}k^{11}+191651217408a_{18}k^{13}+$
$29515853365248a_{20}k^{15}+5526593941929984a_{22}k^{17}+6a_6k+112a_8k^3$

$a_3\to 32640a_{10}k^7+1745920a_{12}k^9+128780288a_{14}k^{11}+12526223360a_{16}k^{13}+1553465966592a_{18}k^{15}+$
$239246490992640a_{20}k^{17}+44796883073761280a_{22}k^{19}+4a_4k+40a_6k^3+896a_8k^5$

$C0 \to a_1 - 79360a_{10}k^9 - 4245504a_{12}k^{11} - 313155584a_{14}k^{13} - 30460116992a_{16}k^{15} - 3777576173568a_{18}k^{17} -$

$2a_2k - 581777702256640a_{20}k^{19} - 108932957168730112a_{22}k^{21} - 8a_4k^3 - 96a_6k^5 - 2176a_8k^7$

Constraints on coefficients from real part of equation:

$b \to -\frac{7251180471056369327800320000a_{22}\chi^{11}}{A^2}$

$a_{20} \to -231a_{22}k^2 - 5291a_{22}$

$a_{18} \to 7315a_{22}k^4 + 1005290a_{22}k^2 + 12329911a_{22}$

$a_{16} \to -74613a_{22}k^6 - 25634895a_{22}k^4 - 1886476383a_{22}k^2 - 16676560901a_{22}$

$a_{14} \to 319770a_{22}k^8 + 205079160a_{22}k^6 + 37729527660a_{22}k^4 + 2001187308120a_{22}k^2 + 14519691974986a_{22}$

$a_{12} \to -646646a_{22}k^{10} - 666507270a_{22}k^8 - 228892467804a_{22}k^6 - 30351340839820a_{22}k^4 - 1321291969723726a_{22}$

$8528645356058126a_{22}$

$a_{10} \to 646646a_{22}k^{12} + 977543996a_{22}k^{10} + 539532245538a_{22}k^8 + 133545899695208a_{22}k^6 + 14534211666960986a_2$

$5628905934998363 16a_{22}k^2 + 34417726518083227 66a_{22}$

$a_8 \to -319770a_{22}k^{14} - 666507270a_{22}k^{12} - 539532245538a_{22}k^{10} - 214627338795870a_{22}k^8 - 43602635000882958$

$42216794512487723 70a_{22}k^4 - 15487976933137452447 0a_{22}k^2 - 95225869594848042650 6a_{22}$

$a_6 \to 74613a_{22}k^{16} + 205079160a_{22}k^{14} + 228892467804a_{22}k^{12} + 133545899695208a_{22}k^{10} + 43602635000882958a_2$

$7880468308997708424a_{22}k^6 + 72277225687974778086 0a_{22}k^4 + 26663243486557451942168a_{22}k^2 +$

$1766350438481085686058 61a_{22}$

$a_4 \to -7315a_{22}k^{18} - 25634895a_{22}k^{16} - 37729527660a_{22}k^{14} - 30351340839820a_{22}k^{12} - 14534211666960986a_{22}k^1$

$42216794512487723 70a_{22}k^8 - 72277225687974778086 0a_{22}k^6 - 66658108716393629855420a_{22}k^4 -$

$2649525657721628529087915a_{22}k^2 - 20872739425587616666078551a_{22}$

$a_2 \to 231a_{22}k^{20} + 1005290a_{22}k^{18} + 1886476383a_{22}k^{16} + 2001187308120a_{22}k^{14} + 1321291969723726a_{22}k^{12} +$

$5628905934998363 16a_{22}k^{10} + 15487976933137452447 0a_{22}k^8 + 26663243486557451942168a_{22}k^6 +$

$2649525657721628529087915a_{22}k^4 + 12523643655352569999647 1306a_{22}k^2 + 14109315799742489967270864 75$

$\omega \to -a_1k + 21a_{22}k^{22} + 100529a_{22}k^{20} + 209608487a_{22}k^{18} + 250148413515a_{22}k^{16} + 188755995674818a_{22}k^{14} +$

$9381509891663938 6a_{22}k^{12} + 30975953866274904894a_{22}k^{10} + 66658108716393629855 42a_{22}k^8 + 8831752192405$

$6261821827676284999823 5653a_{22}k^4 + 14109315799742489967270864 75a_{22}k^2 - 41236408035934408387856390$

y(z) - function:

$$\frac{4194304a^{11}A}{(4a^2e^z + \chi e^{-z})^{11}}$$

u(x, t) - function:

$$\frac{4194304a^{11}Ae^{i(kx-\omega t)}}{(4a^2e^{C0t+x} + \chi e^{-C0t-x})^{11}}$$