

Supplementary Material

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The second-order rogue waves solutions, $\tilde{\psi}[2]$, for Eq. (2) are

$$\begin{aligned} \tilde{\psi}[2] = & e^{ix(1+6\gamma-f_0)} - (4e^{ix(1+6\gamma-f_0)}(-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(1+ \\ & 2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0))/((-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0- \\ & 2iT_0)(-1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)+(1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+ \\ & 2xf_1+2\tau_0-2iT_0)(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)) - (e^{ix(1+6\gamma-f_0)}(12(-1- \\ & 2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)+((-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+ \\ & 2\tau_0-2iT_0)(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)(3-12(-ix+t+6x\alpha-12ix\gamma+ \\ & 30x\delta+xf_1+\tau_0-iT_0)^2-8(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3-6(-5ix+t+38x\alpha- \\ & 124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1-iT_0-4iT_1)))+2(1+4x^2+4t+4t^2+24x\alpha+48xt\alpha+144x^2\alpha^2+ \\ & 96x^2\gamma+576x^2\gamma^2+120x\delta+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+4(1+2t+12x(\alpha+5\delta))\tau_0+4\tau_0^2+ \\ & 4xf_1(1+2t+12x\alpha+60x\delta+2\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)(-\frac{3}{2}(-1+4(-ix+t+6x\alpha-12ix\gamma+30x\delta+ \\ & xf_1+\tau_0-iT_0)^2)+4(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3+3(-5ix+t+38x\alpha-124ix\gamma+ \\ & 350x\delta+xf_1+\tau_0+4\tau_1-iT_0-4iT_1)))/(1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+ \\ & 1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8xf_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+ \\ & 4T_0^2))(12(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)-((1+4x^2-4t+4t^2-24x\alpha+48xt\alpha+ \\ & 144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2-120x\delta+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+4(-1+2t+12x(\alpha+ \\ & 5\delta))\tau_0+4\tau_0^2+4xf_1(-1+2t+12x\alpha+60x\delta+2\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)(3-12(ix+t+6x\alpha+12ix\gamma+ \\ & 30x\delta+xf_1+\tau_0+iT_0)^2-8(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^3-6(5ix+t+38x\alpha+124ix\gamma+ \\ & 350x\delta+xf_1+\tau_0+4\tau_1+iT_0+4iT_1)))/(1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+ \\ & 1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8xf_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+ \\ & 4T_0^2)-(2(-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+ \\ & 2xf_1+2\tau_0+2iT_0)(-\frac{3}{2}(-1+4(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^2)+4(ix+t+6x\alpha+12ix\gamma+ \\ & 30x\delta+xf_1+\tau_0+iT_0)^3+3(5ix+t+38x\alpha+124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1+iT_0+4iT_1)))/(1+4x^2+ \\ & 4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+ \\ & 5\delta))\tau_0+4\tau_0^2+8xf_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)))/(36(\frac{1}{144}(12(-1-2ix+2t+12x\alpha- \\ & 24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)+((-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(1+ \\ & 2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)(3-12(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0- \\ & iT_0)^2-8(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3-6(-5ix+t+38x\alpha-124ix\gamma+350x\delta+xf_1+ \\ & \tau_0+4\tau_1-iT_0-4iT_1)))+2(1+4x^2+4t+4t^2+24x\alpha+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+120x\delta+ \\ & 240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+4(1+2t+12x(\alpha+5\delta))\tau_0+4\tau_0^2+4xf_1(1+2t+12x\alpha+60x\delta+ \\ & 2\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)(-\frac{3}{2}(-1+4(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^2)+4(-ix+ \\ & t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3+3(-5ix+t+38x\alpha-124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1-iT_0- \\ & 4iT_1)))/(1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+ \\ & 8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8xf_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2))(12(-1+2ix+2t+12x\alpha+ \\ & 24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)+((1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(-1+2ix+ \\ & 2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)(3-12(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^2- \\ & 8(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^3-6(5ix+t+38x\alpha+124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1+ \\ & iT_0+4iT_1)))+2(1+4x^2+4t+4t^2+24x\alpha+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+120x\delta+240xt\delta+ \end{aligned}$$

$$\begin{aligned}
& 1440x^2\alpha\delta + 3600x^2\delta^2 + 4x^2f_1^2 + 4(1+2t+12x(\alpha+5\delta))\tau_0 + 4\tau_0^2 + 4xf_1(1+2t+12x\alpha+60x\delta+2\tau_0) + \\
& 8xT_0 + 96x\gamma T_0 + 4T_0^2) \left(-\frac{3}{2}(-1+4(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^2) + 4(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^3 + 3(5ix+t+38x\alpha+124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1+iT_0+4iT_1)) \right) / (1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8x f_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)) + \frac{1}{144}(12(1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0) - ((1+4x^2-4t+4t^2-24x\alpha+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2-120x\delta+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+4(-1+2t+12x(\alpha+5\delta))\tau_0+4\tau_0^2+4xf_1(-1+2t+12x\alpha+60x\delta+2\tau_0)+8xT_0+96x\gamma T_0+4T_0^2))(3-12(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^2-8(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3-6(-5ix+t+38x\alpha-124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1-iT_0-4iT_1)))/ (1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8x f_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)) - (2(1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(-1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)(-\frac{3}{2}(-1+4(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^2)+4(-ix+t+6x\alpha-12ix\gamma+30x\delta+xf_1+\tau_0-iT_0)^3+3(-5ix+t+38x\alpha-124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1-iT_0-4iT_1)))/ (1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8x f_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)) (12(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0) - ((1+4x^2-4t+4t^2-24x\alpha+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2-120x\delta+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+4(-1+2t+12x(\alpha+5\delta))\tau_0+4\tau_0^2+4xf_1(-1+2t+12x\alpha+60x\delta+2\tau_0)+8xT_0+96x\gamma T_0+4T_0^2))(3-12(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^2-8(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^3-6(5ix+t+38x\alpha+124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1+iT_0+4iT_1)))/ (1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8x f_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)) - (2(-1-2ix+2t+12x\alpha-24ix\gamma+60x\delta+2xf_1+2\tau_0-2iT_0)(1+2ix+2t+12x\alpha+24ix\gamma+60x\delta+2xf_1+2\tau_0+2iT_0)(-\frac{3}{2}(-1+4(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^2)+4(ix+t+6x\alpha+12ix\gamma+30x\delta+xf_1+\tau_0+iT_0)^3+3(5ix+t+38x\alpha+124ix\gamma+350x\delta+xf_1+\tau_0+4\tau_1+iT_0+4iT_1)))/ (1+4x^2+4t^2+48xt\alpha+144x^2\alpha^2+96x^2\gamma+576x^2\gamma^2+240xt\delta+1440x^2\alpha\delta+3600x^2\delta^2+4x^2f_1^2+8(t+6x(\alpha+5\delta))\tau_0+4\tau_0^2+8x f_1(t+6x(\alpha+5\delta)+\tau_0)+8xT_0+96x\gamma T_0+4T_0^2)))) .
\end{aligned}$$

The third-order rogue waves solutions, $\tilde{\psi}[3]$, for Eq. (2) with $f_0 = 0$, $f_1 = 0$, $\alpha = 0$, $\gamma = 0$, $\tau_0 = 0$, $T_0 = 0$, $\tau_1 = 0$, $\tau_2 = 0$ are

$$\begin{aligned}
\tilde{\psi}[3] = & (e^{ix}(14175+226800ix-567000x^2-475200ix^3-5238000x^4-7395840ix^5+2384640x^6- \\
& 2672640ix^7+2085120x^8+307200ix^9+141312x^{10}+49152ix^{11}-4096x^{12}-113400t^2+907200ixt^2- \\
& 4600800x^2t^2-4838400ix^3t^2+5356800x^4t^2+5253120ix^5t^2-875520x^6t^2-737280ix^7t^2+829440x^8t^2+ \\
& 245760ix^9t^2-24576x^{10}t^2-226800t^4-1036800ixt^4-172800x^2t^4-1382400ix^3t^4-576000x^4t^4- \\
& 2580480ix^5t^4+1658880x^6t^4+491520ix^7t^4-61440x^8t^4+172800t^6-460800ixt^6-506880x^2t^6- \\
& 1720320ix^3t^6+1413120x^4t^6+491520ix^5t^6-81920x^6t^6+57600t^8-184320ixt^8+460800x^2t^8+ \\
& 245760ix^3t^8-61440x^4t^8+18432t^{10}+49152ixt^{10}-24576x^2t^{10}-4096t^{12}-81972000xt\delta-360288000ix^2t\delta- \\
& 101865600x^3t\delta-533606400ix^4t\delta+426470400x^5t\delta-127180800ix^6t\delta+316108800x^7t\delta+73728000ix^8t\delta+ \\
& 35020800x^9t\delta+14745600ix^{10}t\delta-1474560x^{11}t\delta-137808000xt^3\delta-257126400ix^2t^3\delta+311040000x^3t^3\delta+
\end{aligned}$$

$$\begin{aligned}
& 305971200ix^4t^3\delta+107827200x^5t^3\delta-73728000ix^6t^3\delta+159744000x^7t^3\delta+58982400ix^8t^3\delta-7372800x^9t^3\delta+ \\
& 18938880xt^5\delta-277585920ix^2t^5\delta+183029760x^3t^5\delta-191692800ix^4t^5\delta+224870400x^5t^5\delta+88473600ix^6t^5\delta- \\
& 14745600x^7t^5\delta+7925760xt^7\delta-44236800ix^2t^7\delta+110592000x^3t^7\delta+58982400ix^4t^7\delta-14745600x^5t^7\delta+ \\
& 10444800xt^9\delta+14745600ix^2t^9\delta-7372800x^3t^9\delta-1474560xt^{11}\delta+4419424800x^2\delta^2-29607379200ix^3\delta^2+ \\
& 24674025600x^4\delta^2-19616256000ix^5\delta^2+32082048000x^6\delta^2+3843072000ix^7\delta^2+8206848000x^8\delta^2+ \\
& 2875392000ix^9\delta^2+304128000x^{10}\delta^2+221184000ix^{11}\delta^2-22118400x^{12}\delta^2-17448566400x^2t^2\delta^2- \\
& 4271616000ix^3t^2\delta^2-4250880000x^4t^2\delta^2+17307648000ix^5t^2\delta^2+17238528000x^6t^2\delta^2+7299072000ix^7t^2\delta^2+ \\
& 5419008000x^8t^2\delta^2+2654208000ix^9t^2\delta^2-331776000x^{10}t^2\delta^2+14000256000x^2t^4\delta^2-8875008000ix^3t^4\delta^2+ \\
& 21026304000x^4t^4\delta^2-5529600000ix^5t^4\delta^2+14653440000x^6t^4\delta^2+6635520000ix^7t^4\delta^2-1105920000x^8t^4\delta^2- \\
& 671846400x^2t^6\delta^2-4644864000ix^3t^6\delta^2+11612160000x^4t^6\delta^2+6193152000ix^5t^6\delta^2-1548288000x^6t^6\delta^2+ \\
& 2073600000x^2t^8\delta^2+1990656000ix^3t^8\delta^2-995328000x^4t^8\delta^2-243302400x^2t^{10}\delta^2-1070915904000x^3t\delta^3- \\
& 1797396480000ix^4t\delta^3-51840000000x^5t\delta^3+63037440000ix^6t\delta^3+680970240000x^7t\delta^3+358318080000ix^8t\delta^3+ \\
& 72990720000x^9t\delta^3+53084160000ix^{10}t\delta^3-6635520000x^{11}t\delta^3+1248998400000x^3t^3\delta^3+1184440320000ix^4t^3\delta^3+ \\
& 602173440000x^5t^3\delta^3+132710400000ix^6t^3\delta^3+497664000000x^7t^3\delta^3+265420800000ix^8t^3\delta^3- \\
& 44236800000x^9t^3\delta^3-183638016000x^3t^5\delta^3-278691840000ix^4t^5\delta^3+696729600000x^5t^5\delta^3+ \\
& 371589120000ix^6t^5\delta^3-92897280000x^7t^5\delta^3+218972160000x^3t^7\delta^3+159252480000ix^4t^7\delta^3- \\
& 79626240000x^5t^7\delta^3-24330240000x^3t^9\delta^3-41194539360000x^4\delta^4-56180044800000ix^5\delta^4+ \\
& 108086400000000x^6\delta^4-43047936000000ix^7\delta^4+82923264000000x^8\delta^4+42799104000000ix^9\delta^4+ \\
& 28200960000000x^{10}\delta^4+398131200000ix^{11}\delta^4-497664000000x^{12}\delta^4+39822451200000x^4t^2\delta^4+ \\
& 851751936000000ix^5t^2\delta^4-3769804800000x^6t^2\delta^4+10948608000000ix^7t^2\delta^4+9206784000000x^8t^2\delta^4+ \\
& 59719680000000ix^9t^2\delta^4-995328000000x^{10}t^2\delta^4-14251852800000x^4t^4\delta^4-10450944000000ix^5t^4\delta^4+ \\
& 26127360000000x^6t^4\delta^4+13934592000000ix^7t^4\delta^4-3483648000000x^8t^4\delta^4+14282956800000x^4t^6\delta^4+ \\
& 8360755200000ix^5t^6\delta^4-4180377600000x^6t^6\delta^4-1642291200000x^4t^8\delta^4+477570816000000x^5t\delta^5+ \\
& 2011060224000000ix^6t\delta^5-396389376000000x^7t\delta^5+226934784000000ix^8t\delta^5+86593536000000x^9t\delta^5+ \\
& 71663616000000ix^{10}t\delta^5-11943936000000x^{11}t\delta^5-566590464000000x^5t^3\delta^5-250822656000000ix^6t^3\delta^5+ \\
& 627056640000000x^7t^3\delta^5+334430208000000ix^8t^3\delta^5-83607552000000x^9t^3\delta^5+614515507200000x^5t^5\delta^5+ \\
& 300987187200000ix^6t^5\delta^5-150493593600000x^7t^5\delta^5-78829977600000x^5t^7\delta^5+1203911424000000x^6\delta^6+ \\
& 16433362944000000ix^7\delta^6-4454341632000000x^8\delta^6+1612431360000000ix^9\delta^6+313528320000000x^{10}\delta^6+ \\
& 358318080000000ix^{11}\delta^6-59719680000000x^{12}\delta^6-12583683072000000x^6t^2\delta^6-3762339840000000ix^7t^2\delta^6+ \\
& 9405849600000000x^8t^2\delta^6+5016453120000000ix^9t^2\delta^6-1254113280000000x^{10}t^2\delta^6+ \\
& 17871114240000000x^6t^4\delta^6+7524679680000000ix^7t^4\delta^6-3762339840000000x^8t^4\delta^6- \\
& 27590492160000000x^6t^6\delta^6-149015531520000000x^7t\delta^7-32248627200000000ix^8t\delta^7+ \\
& 80621568000000000x^9t\delta^7+42998169600000000ix^{10}t\delta^7-10749542400000000x^{11}t\delta^7+ \\
& 349360128000000000x^7t^3\delta^7+1289945088000000000ix^8t^3\delta^7-64497254400000000x^9t^3\delta^7- \\
& 709469798400000000x^7t^5\delta^7-736175692800000000x^8\delta^8-120932352000000000ix^9\delta^8+ \\
& 302330880000000000x^{10}\delta^8+161243136000000000ix^{11}\delta^8-40310784000000000x^{12}\delta^8+ \\
& 4414030848000000000x^8t^2\delta^8+1451188224000000000ix^9t^2\delta^8-725594112000000000x^{10}t^2\delta^8- \\
& 1330255872000000000x^8t^4\delta^8+3265173504000000000x^9t\delta^9+967458816000000000ix^{10}t\delta^9-
\end{aligned}$$

$$\begin{aligned}
& 4837294080000000000x^{11}t\delta^9 - 17736744960000000000x^9t^3\delta^9 + 107629793280000000000x^{10}\delta^{10} + \\
& 290237644800000000000ix^{11}\delta^{10} - 145118822400000000000x^{12}\delta^{10} - 159630704640000000000x^{10}t^2\delta^{10} - \\
& 870712934400000000000x^{11}t\delta^{11} - 2176782336000000000000x^{12}\delta^{12} - 691200(-3it^2 + 3x(2 + t^2 - \\
& 60it\delta) + 3x^2(i + 60t\delta - 900i\delta^2) + x^3(-1 + 2700\delta^2))T_1^3 - 518400T_1^4 - 1440(-5i(9 + 108t^2 + 48t^4 + \\
& 64t^6) + 5x(9 + 108t^2 + 48t^4 + 64t^6 - 18000it\delta + 9600it^3\delta - 11520it^5\delta) + 64x^7(1 - 8100\delta^2 - 4050000\delta^4 + \\
& 3645000000\delta^6) + 60x^2(1500t\delta - 800t^3\delta + 960t^5\delta + 3i(11 - 37900\delta^2) + 24it^2(-1 + 3900\delta^2) - 16it^4(-1 + \\
& 4500\delta^2)) + 20x^3(-177 + 341100\delta^2 - 216t^2(-1 + 1300\delta^2) - 5760it^3\delta(-1 + 1500\delta^2) + 16t^4(-1 + \\
& 13500\delta^2) + 7200it(\delta + 1260\delta^3)) + 240x^4(160t^3\delta(-1 + 4500\delta^2) + t(760\delta - 756000\delta^3) - 12it^2(-1 - \\
& 1800\delta^2 + 1350000\delta^4) + 5i(-1 + 4680\delta^2 + 1566000\delta^4)) + 48x^5(-11 + 33000\delta^2 - 39150000\delta^4 - \\
& 3600it\delta(-1 - 600\delta^2 + 270000\delta^4) + 12t^2(-1 - 3000\delta^2 + 6750000\delta^4)) + 64x^6(540t\delta(-1 - 1000\delta^2 + \\
& 1350000\delta^4) - i(7 - 40500\delta^2 - 12150000\delta^4 + 3645000000\delta^6)))T_2 - 129600(-3 + 4t^2 + 8x(-i + 30t\delta) + \\
& 4x^2(1 + 900\delta^2))T_2^2 - 1440T_1^2(-45 + 540t^2 + 600t^4 + 224t^6 + 120x(3i - 12it^2 + 8it^4 + 1854t\delta + 920t^3\delta + \\
& 336t^5\delta) + 96x^6(1 + 13500\delta^2 - 4050000\delta^4 + 1701000000\delta^6) + 480x^3(12it^2(-1 + 900\delta^2) + 120t^3\delta(-1 + \\
& 2100\delta^2) + 30t\delta(-17 + 11700\delta^2) + i(11 + 11700\delta^2)) + 60x^2(2400it\delta + 1920it^3\delta + 36t^2(-1 + 3100\delta^2) + \\
& 8t^4(-1 + 6300\delta^2) + 15(7 + 11996\delta^2)) + 120x^4(-23 - 45000\delta^2 + 12690000\delta^4 + 2880it\delta(-1 + 300\delta^2) + \\
& 12t^2(1 - 1800\delta^2 + 1890000\delta^4)) + 576x^5(i(-1 - 9000\delta^2 + 1350000\delta^4) + 150t(\delta - 600\delta^3 + 378000\delta^5)) - \\
& 720(-i + x)T_2) + 960T_1(-3i(-45 - 315t^2 + 60t^4 + 112t^6 + 64t^8) + 3x(-135 - 1395t^2 - 420t^4 - 528t^6 + \\
& 64t^8 - 18540it\delta + 4320it^3\delta - 50880it^5\delta - 15360it^7\delta) + 64x^9(1 + 900\delta^2)^3(-1 + 2700\delta^2) + 576x^8(1 + \\
& 900\delta^2)^2(i - 1800i\delta^2 + 72000t\delta^3 - 270000i\delta^4) + 48x^7(31 + 900(-35 + 48t^2)\delta^2 - 4320000it\delta^3 + \\
& 1350000(-149 + 96t^2)\delta^4 - 4665600000it\delta^5 + 729000000(31 + 112t^2)\delta^6 - 69984000000it\delta^7) + \\
& 3x^2(-161460t\delta + 91680t^3\delta - 64320t^5\delta + 15360t^7\delta - 512it^6(1 + 3150\delta^2) + 360it^2(-3 + 14780\delta^2) - \\
& 240it^4(1 + 25500\delta^2) - 45i(11 + 151780\delta^2)) + x^3(-1680t^4(1 + 4500\delta^2) + 512t^6(1 + 9450\delta^2) + 1800t^2(7 + \\
& 9852\delta^2) - 28800it^3\delta(-29 + 35100\delta^2) + 12960it\delta(-7 + 69700\delta^2) - 45(221 + 454260\delta^2) - 276480it^5(\delta + \\
& 1050\delta^3)) + 60x^4(-160t^3\delta(53 + 2700\delta^2) + 24t\delta(181 + 128700\delta^2) + 1536t^5(\delta + 3150\delta^3) - 300it^2(-1 - \\
& 4392\delta^2 + 1609200\delta^4) - 32it^4(1 + 10800\delta^2 + 5670000\delta^4) + 3i(-73 - 75720\delta^2 + 73494000\delta^4)) + \\
& 12x^5(627 + 90600\delta^2 - 162810000\delta^4 + 36t^2(-11 - 85000\delta^2 + 13050000\delta^4) + 32t^4(1 + 18000\delta^2 + \\
& 28350000\delta^4) - 1200it\delta(-43 - 167400\delta^2 + 29322000\delta^4) - 19200it^3(\delta + 3600\delta^3 + 1134000\delta^5)) + \\
& 48x^6(60t\delta(-67 - 351000\delta^2 + 49410000\delta^4) + 960t^3(\delta + 6000\delta^3 + 5670000\delta^5) - 216000it^2(\delta^2 + 1800\delta^4 + \\
& 378000\delta^6) - i(1 - 49500\delta^2 - 506250000\delta^4 + 51759000000\delta^6)) + 90(3 + 6t^2 + 8t^4 + 12x(-3i + 190t\delta + \\
& 80t^3\delta) + 6x^2(11 + 300(35 + 24t^2)\delta^2) + 32x^3(i + 27000t\delta^3) + 8x^4(-1 + 810000\delta^4))T_2)))/(2025 + \\
& 372600x^2 + 2300400x^4 + 979200x^6 + 956160x^8 + 129024x^{10} + 4096x^{12} + 48600t^2 - 583200x^2t^2 + \\
& 5011200x^4t^2 + 3456000x^6t^2 + 276480x^8t^2 + 24576x^{10}t^2 + 54000t^4 + 864000x^2t^4 - 345600x^4t^4 + \\
& 61440x^6t^4 + 61440x^8t^4 + 149760t^6 + 138240x^2t^6 - 184320x^4t^6 + 81920x^6t^6 + 34560t^8 - 92160x^2t^8 + \\
& 61440x^4t^8 + 6144t^{10} + 24576x^2t^{10} + 4096t^{12} + 20023200xt\delta + 354844800x^3t\delta + 416793600x^5t\delta + \\
& 251596800x^7t\delta + 31334400x^9t\delta + 1474560x^{11}t\delta - 37756800xt^3\delta + 479692800x^3t^3\delta + 371404800x^5t^3\delta + \\
& 46694400x^7t^3\delta + 7372800x^9t^3\delta + 30274560xt^5\delta - 72437760x^3t^5\delta - 3686400x^5t^5\delta + 14745600x^7t^5\delta + \\
& 14192640xt^7\delta - 22118400x^3t^7\delta + 14745600x^5t^7\delta - 3072000xt^9\delta + 7372800x^3t^9\delta + 1474560xt^{11}\delta + \\
& 5359413600x^2\delta^2 + 15450134400x^4\delta^2 + 14850432000x^6\delta^2 + 6501888000x^8\delta^2 + 691200000x^{10}\delta^2 +
\end{aligned}$$

$$\begin{aligned}
& 22118400x^{12}\delta^2 - 4054665600x^2t^2\delta^2 + 45142272000x^4t^2\delta^2 + 30868992000x^6t^2\delta^2 + 3870720000x^8t^2\delta^2 + \\
& 331776000x^{10}t^2\delta^2 + 2298240000x^2t^4\delta^2 + 539136000x^4t^4\delta^2 + 1935360000x^6t^4\delta^2 + 1105920000x^8t^4\delta^2 + \\
& 2994278400x^2t^6\delta^2 - 2322432000x^4t^6\delta^2 + 1548288000x^6t^6\delta^2 - 1078272000x^2t^8\delta^2 + 995328000x^4t^8\delta^2 + \\
& 243302400x^2t^{10}\delta^2 - 825598656000x^3t\delta^3 + 444994560000x^5t\delta^3 + 812021760000x^7t\delta^3 + 112803840000x^9t\delta^3 + \\
& 6635520000x^{11}t\delta^3 + 438082560000x^3t^3\delta^3 + 791285760000x^5t^3\delta^3 + 165888000000x^7t^3\delta^3 + 44236800000x^9t^3\delta^3 + \\
& 322983936000x^3t^5\delta^3 - 139345920000x^5t^5\delta^3 + 92897280000x^7t^5\delta^3 - 139345920000x^3t^7\delta^3 + 79626240000x^5t^7\delta^3 + \\
& 24330240000x^3t^9\delta^3 - 948270240000x^4\delta^4 - 15026342400000x^6\delta^4 + 6886425600000x^8\delta^4 + 1111449600000x^{10}\delta^4 + \\
& 49766400000x^{12}\delta^4 + 33371481600000x^4t^2\delta^4 + 47066572800000x^6t^2\delta^4 + 5723136000000x^8t^2\delta^4 + \\
& 995328000000x^{10}t^2\delta^4 + 19477324800000x^4t^4\delta^4 - 5225472000000x^6t^4\delta^4 + 3483648000000x^8t^4\delta^4 - \\
& 10102579200000x^4t^6\delta^4 + 4180377600000x^6t^6\delta^4 + 1642291200000x^4t^8\delta^4 + 966898944000000x^5t\delta^5 + \\
& 1059277824000000x^7t\delta^5 + 92565504000000x^9t\delta^5 + 11943936000000x^{11}t\delta^5 + 692001792000000x^5t^3\delta^5 - \\
& 125411328000000x^7t^3\delta^5 + 83607552000000x^9t^3\delta^5 - 464021913600000x^5t^5\delta^5 + 150493593600000x^7t^5\delta^5 + \\
& 78829977600000x^5t^7\delta^5 + 9565786368000000x^6\delta^6 + 8485420032000000x^8\delta^6 + 582266880000000x^{10}\delta^6 + \\
& 59719680000000x^{12}\delta^6 + 14464852992000000x^6t^2\delta^6 - 1881169920000000x^8t^2\delta^6 + 1254113280000000x^{10}t^2\delta^6 - \\
& 14108774400000000x^6t^4\delta^6 + 3762339840000000x^8t^4\delta^6 + 2759049216000000x^6t^6\delta^6 + \\
& 165139845120000000x^7t\delta^7 - 16124313600000000x^9t\delta^7 + 10749542400000000x^{11}t\delta^7 - \\
& 284862873600000000x^7t^3\delta^7 + 64497254400000000x^9t^3\delta^7 + 70946979840000000x^7t^5\delta^7 + \\
& 796641868800000000x^8\delta^8 - 60466176000000000x^{10}\delta^8 + 40310784000000000x^{12}\delta^8 - \\
& 3688436736000000000x^8t^2\delta^8 + 725594112000000000x^{10}t^2\delta^8 + 1330255872000000000x^8t^4\delta^8 - \\
& 27814440960000000000x^9t\delta^9 + 4837294080000000000x^{11}t\delta^9 + 17736744960000000000x^9t^3\delta^9 - \\
& 93117911040000000000x^{10}\delta^{10} + 14511882240000000000x^{12}\delta^{10} + 159630704640000000000x^{10}t^2\delta^{10} + \\
& 870712934400000000000x^{11}t\delta^{11} + 2176782336000000000000x^{12}\delta^{12} + 691200x(3(1+t^2) + 180xt\delta + \\
& x^2(-1+2700\delta^2))T_1^3 + 518400T_1^4 + 1440x(5(45-180t^2-144t^4+64t^6) + 1200xt(-189-136t^2+ \\
& 48t^4))\delta + 34560x^5t\delta(-1-1000\delta^2+1350000\delta^4) + 64x^6(1-8100\delta^2-4050000\delta^4+3645000000\delta^6) + \\
& 9600x^3t\delta(-17-29700\delta^2+4t^2(-1+4500\delta^2)) + 20x^2(-72t^2(1+7500\delta^2)-9(1+7700\delta^2)+16t^4(-1+ \\
& 13500\delta^2)) + 48x^4(17-75000\delta^2-55350000\delta^4+12t^2(-1-3000\delta^2+6750000\delta^4)))T_2 + 129600(1+4t^2+ \\
& 240xt\delta+4x^2(1+900\delta^2))T_2^2 + 1440T_1^2(135-180t^2+120t^4+224t^6+240xt(267+220t^2+168t^4))\delta + \\
& 86400x^5t\delta(1-600\delta^2+378000\delta^4) + 96x^6(1+13500\delta^2-4050000\delta^4+1701000000\delta^6) + 60x^2(36t^2(3+ \\
& 1900\delta^2) + 8t^4(-1+6300\delta^2) + 15(3+7436\delta^2)) + 14400x^3t\delta(19+8100\delta^2+t^2(-4+8400\delta^2)) + \\
& 120x^4(-11+19800\delta^2+9450000\delta^4+12t^2(1-1800\delta^2+1890000\delta^4)) - 720xT_2 - 960T_1(x(3(-180+ \\
& 405t^2-180t^4-16t^6+64t^8) + 180xt(-1467-3112t^2+464t^4+256t^6))\delta + 41472000x^7t\delta^3(1+ \\
& 900\delta^2)^2 + 64x^8(1+900\delta^2)^3(-1+2700\delta^2) + 48x^6(-17+900(-35+48t^2)\delta^2 + 1350000(-101+ \\
& 96t^2)\delta^4 + 5103000000(9+16t^2)\delta^6) + 480x^3t\delta(-597-4635900\delta^2+192t^4(1+3150\delta^2)+100t^2(-1+ \\
& 16740\delta^2)) + x^2(2160t^4(1+6100\delta^2)+512t^6(1+9450\delta^2)-1080t^2(11+56780\delta^2)-45(101+108180\delta^2)) + \\
& 2880x^5t\delta(-67-207000\delta^2+127170000\delta^4+16t^2(1+6000\delta^2+5670000\delta^4)) + 12x^4(63+558600\delta^2- \\
& 2187810000\delta^4+32t^4(1+18000\delta^2+28350000\delta^4)+36t^2(-11-37000\delta^2+56250000\delta^4))) + 90(-3+ \\
& 6t^2+8t^4+120xt(19+8t^2)\delta+864000x^3t\delta^3+18x^2(1+100(35+24t^2)\delta^2)+8x^4(-1+810000\delta^4))T_2) .
\end{aligned}$$