Anhang II : Berechnungen höherer Ordnung

Die Ergebnisse höherer Ordnungen, die in dieser Arbeit teilweise für die Erstellung der Grafiken und Tabellen verwendet wurden, sind aus der Arbeit mit guten Grund ausgegliedert worden. Sie in den einzelnen Herleitungsschritten unterzubringen, würde nur viel Platz und auf Dauer höchstwahrscheinlich Konfusion beim Leser bewirken. Sie werden in kompakter Form in diesem Abschnitt angeführt und zusammengefasst dargestellt. Ihre Bedeutung kann aus den jeweiligen Abschnitten entnommen werden.

Für eine Reproduktion der Terme sowie mancher Zwischenschritte, die mit gutem Grund übergangen wurden, steht dem Leser die beiliegende CD-Rom mit dem *Mathematica* - Package *Sitnikov Derivation System* zur Verfügung. Eine Beschreibung hierfür findet sich auf der CD bzw. in Anhang I.

Die Ergebnisse werden teilweise in Maschinengenauigkeit, teilweise in Ganzzahlarithmetik angeführt. Die dem Leser angenehme Form kann auf jeden Fall mit den Funktionen der SDS erzeugt werden.

■ Ergebnisse der linearen Analyse (Kapitel 2)

■ Abstand der Primärkörper, 13. Ordnung in e:

Implementation in SDS: **PrimariesDistance[n]**

$$\begin{aligned}
r(t) = {} & 0.5 + 0.25\, e^2 + (-0.5\, e + 0.1875\, e^3 - 0.0130208\, e^5 + \\
& \quad 0.000379774\, e^7 - 6.10352\times 10^{-6}\, e^9 + 6.21654\times 10^{-8}\, e^{11} - 4.37311\times 10^{-10}\, e^{13})\cos(t) + \\
& (-0.25\, e^2 + 0.166667\, e^4 - 0.03125\, e^6 + 0.00277778\, e^8 - 0.000144676\, e^{10} + 4.96032\times 10^{-6}\, e^{12})\cos(2.\, t) + \\
& (-0.1875\, e^3 + 0.175781\, e^5 - 0.0553711\, e^7 + 0.00889893\, e^9 - 0.000874002\, e^{11} + 0.0000581012\, e^{13})\cos(3.\, t) + \\
& (-0.166667\, e^4 + 0.2\, e^6 - 0.0888889\, e^8 + 0.021164\, e^{10} - 0.0031746\, e^{12})\cos(4.\, t) + \\
& (-0.16276\, e^5 + 0.237359\, e^7 - 0.136239\, e^9 + 0.0433632\, e^{11} - 0.00889711\, e^{13})\cos(5.\, t) + \\
& (-0.16875\, e^6 + 0.289286\, e^8 - 0.203404\, e^{10} + 0.0813616\, e^{12})\cos(6.\, t) + \\
& (-0.182368\, e^7 + 0.359036\, e^9 - 0.298643\, e^{11} + 0.144118\, e^{13})\cos(7.\, t) + \\
& (-0.203175\, e^8 + 0.451499\, e^{10} - 0.433439\, e^{12})\cos(8.\, t) + \\
& (-0.23169\, e^9 + 0.573432\, e^{11} - 0.623786\, e^{13})\cos(9.\, t) + (-0.269114\, e^{10} + 0.733948\, e^{12})\cos(10.\, t) + \\
& (-0.317279\, e^{11} + 0.945227\, e^{13})\cos(11.\, t) - 0.378701\, e^{12}\cos(12.\, t) - 0.45672\, e^{13}\cos(13.\, t)
\end{aligned}$$

■ Linearer Koeffizient der polynomischen Bewegungsgleichung, 13. Ordnung in e:

Implementation in SDS: **LinearCoefficient[n]**

$$\begin{aligned}
g(t) = {} & 8. + 12.\, e^2 + 15.\, e^4 + 17.5\, e^6 + 19.6875\, e^8 + 21.6563\, e^{10} + 23.4609\, e^{12} + \\
& (24.\, e + 27.\, e^3 + 32.625\, e^5 + 37.263\, e^7 + 41.3972\, e^9 + 45.1575\, e^{11} + 48.6294\, e^{13})\cos(t) + \\
& (36.\, e^2 + 28.\, e^4 + 35.25\, e^6 + 39.4\, e^8 + 43.334\, e^{10} + 46.9359\, e^{12})\cos(2.\, t) + \\
& (53.\, e^3 + 24.5625\, e^5 + 38.6766\, e^7 + 41.3197\, e^9 + 45.1998\, e^{11} + 48.6521\, e^{13})\cos(3.\, t) + \\
& (77.\, e^4 + 12.9\, e^6 + 44.95\, e^8 + 42.571\, e^{10} + 47.0626\, e^{12})\cos(4.\, t) +
\end{aligned}$$

$$(110.813\,e^5 - 12.987\,e^7 + 58.3587\,e^9 + 41.7355\,e^{11} + 49.2105\,e^{13})\cos(5.\,t) +$$
$$(158.35\,e^6 - 62.4857\,e^8 + 87.1192\,e^{10} + 35.2147\,e^{12})\cos(6.\,t) +$$
$$(225.047\,e^7 - 150.09\,e^9 + 146.137\,e^{11} + 14.9347\,e^{13})\cos(7.\,t) +$$
$$(318.448\,e^8 - 297.925\,e^{10} + 261.445\,e^{12})\cos(8.\,t) +$$
$$(449.014\,e^9 - 539.443\,e^{11} + 477.257\,e^{13})\cos(9.\,t) + (631.244\,e^{10} - 924.824\,e^{12})\cos(10.\,t) +$$
$$(885.214\,e^{11} - 1528.82\,e^{13})\cos(11.\,t) + 1238.7\,e^{12}\cos(12.\,t) + 1730.13\,e^{13}\cos(13.\,t)$$

- **Linearisierte Amplitudenfunktion, 13. Ordnung in e:**

Implementation in SDS: **AmplitudeFunction[n]**

$$\begin{aligned}
w(t) = 2^{1/4}\,(&0.5 + 0.182427\,e^2 + 0.00304931\,e^4 + 0.000589959\,e^6 + 0.00021264\,e^8 + \\
&0.0000966309\,e^{10} + 0.0000517158\,e^{12} + (-0.387097\,e + 0.158605\,e^3 - 0.00781688\,e^5 + \\
&\quad 0.000837677\,e^7 + 0.000292816\,e^9 + 0.000119582\,e^{11} + 0.0000933929\,e^{13})\cos(t) + \\
&(-0.220083\,e^2 + 0.151501\,e^4 - 0.0259218\,e^6 + 0.00244641\,e^8 + 0.000241329\,e^{10} - 0.0000371828\,e^{12}) \\
&\cos(2.\,t) + \\
&(-0.177059\,e^3 + 0.168124\,e^5 - 0.0504248\,e^7 + 0.00756497\,e^9 + 6.89405\times 10^{-6}\,e^{11} - 0.000460477\,e^{13}) \\
&\cos(3.\,t) + (-0.165119\,e^4 + 0.198822\,e^6 - 0.0851956\,e^8 + 0.0186122\,e^{10} - 0.00109863\,e^{12})\cos(4.\,t) + \\
&(-0.167182\,e^5 + 0.243298\,e^7 - 0.135228\,e^9 + 0.0394918\,e^{11} - 0.00457363\,e^{13})\cos(5.\,t) + \\
&(-0.178389\,e^6 + 0.304048\,e^8 - 0.207341\,e^{10} + 0.0763609\,e^{12})\cos(6.\,t) + \\
&(-0.197405\,e^7 + 0.38537\,e^9 - 0.31103\,e^{11} + 0.138745\,e^{13})\cos(7.\,t) + \\
&(-0.224372\,e^8 + 0.493389\,e^{10} - 0.459597\,e^{12})\cos(8.\,t) + \\
&(-0.260303\,e^9 + 0.636457\,e^{11} - 0.671682\,e^{13})\cos(9.\,t) + (-0.306921\,e^{10} + 0.825804\,e^{12})\cos(10.\,t) + \\
&(-0.366674\,e^{11} + 1.07645\,e^{13})\cos(11.\,t) - 0.442846\,e^{12}\cos(12.\,t) - 0.539752\,e^{13}\cos(13.\,t))
\end{aligned}$$

- **Linearisierte Phasenfunktion, 13. Ordnung in e:**

Implementation in SDS: **PhaseFunction[n]**

$$\begin{aligned}
\psi(t) = \sqrt{2}\,(&(2. + 0.33871\,e^2 + 0.187991\,e^4 + 0.129773\,e^6 + 0.0990389\,e^8 + 0.0800622\,e^{10} + 0.0671837\,e^{12})\,t + \\
&(3.09677\,e + 0.170387\,e^3 + 0.317166\,e^5 + 0.223317\,e^7 + 0.176677\,e^9 + 0.145952\,e^{11} + 0.12426\,e^{13})\sin(t) + \\
&(1.7794\,e^2 - 0.314892\,e^4 + 0.191083\,e^6 + 0.0933242\,e^8 + 0.0795974\,e^{10} + 0.0670573\,e^{12})\sin(2.\,t) + \\
&(1.46306\,e^3 - 0.623567\,e^5 + 0.238156\,e^7 + 0.0367211\,e^9 + 0.0493446\,e^{11} + 0.0417333\,e^{13})\sin(3.\,t) + \\
&(1.39478\,e^4 - 0.948666\,e^6 + 0.387878\,e^8 - 0.0264157\,e^{10} + \\
&\quad 0.039707\,e^{12})\sin(4.\,t) + (1.442\,e^5 - 1.34897\,e^7 + 0.657682\,e^9 \\
&\quad - 0.134514\,e^{11} + 0.0489579\,e^{13})\sin(5.\,t) + \\
&(1.56911\,e^6 - 1.86893\,e^8 + 1.09467\,e^{10} - 0.334171\,e^{12})\sin(6.\,t) + \\
&(1.76863\,e^7 - 2.55832\,e^9 + 1.77384\,e^{11} - 0.69599\,e^{13})\sin(7.\,t) + (2.0454\,e^8 - 3.48042\,e^{10} + 2.80624\,e^{12}) \\
&\sin(8.\,t) + (2.41223\,e^9 - 4.71896\,e^{11} + 4.35307\,e^{13})\sin(9.\,t) + (2.88895\,e^{10} - 6.38613\,e^{12})\sin(10.\,t) + \\
&(3.50309\,e^{11} - 8.63304\,e^{13})\sin(11.\,t) + 4.29141\,e^{12}\sin(12.\,t) + 5.30231\,e^{13}\sin(13.\,t))
\end{aligned}$$

- **Lösung der linearisierten Gleichung vom Hill´schen Typus**

Implementation in SDS: **LinearSolution[n]**

$$w_0 = w(0)$$

$$z_0 = z(0)$$

$$z_0' = z'(0)$$

$$z(t) = \frac{z_0}{w_0}\,w(t)\cos(\psi(t)) + w_0\,z_0'\,w(t)\sin(\psi(t))$$

▪ Phasenverschiebung der linearisierten Lösung, 17. Ordnung in e:

Implementation in SDS: **PhaseShift[n]**

$$\phi(e) = \sqrt{2}\,(2. + 0.33871\,e^2 + 0.187991\,e^4 + 0.129773\,e^6 + 0.0990389\,e^8 + 0.0800622\,e^{10} + 0.0671837\,e^{12} + 0.0578724\,e^{14} + 0.050827\,e^{16}) + O(e^{18})$$

▪ Transfer Matrix R, 7. Odnung in e:

Implementation in SDS: **TransferMatrix[n]**

$$R = \begin{pmatrix} r_{11} & r_{12} \\ r_{21} & r_{22} \end{pmatrix}$$

$$r_{11} = \cos(1.15313\,e^6 + 1.67044\,e^4 + 3.00969\,e^2 + 17.7715)$$

$$r_{12} = (2.57531\times 10^{17}\sin(1.15313\,e^6 + 1.67044\,e^4 + 3.00969\,e^2 + 17.7715)) / (2.39402\times 10^{18}\,e^7 + 2.23327\times 10^{18}\,e^6 + 2.06011\times 10^{18}\,e^5 + 1.87104\times 10^{18}\,e^4 + 1.66061\times 10^{18}\,e^3 + 1.41948\times 10^{18}\,e^2 + 1.12786\times 10^{18}\,e + 7.28407\times 10^{17})$$

$$r_{21} = (-9.29604\,e^7 - 8.67187\,e^6 - 7.99948\,e^5 - 7.2653\,e^4 - 6.4482\,e^3 - 5.5119\,e^2 - 4.3795\,e - 2.82843)\sin(1.15313\,e^6 + 1.67044\,e^4 + 3.00969\,e^2 + 17.7715)$$

$$r_{22} = r_{11}$$

▪ Resultate der nichtlinearen Analyse (Kapitel 1 u. 3)

▪ Polynomische Differentialgleichung des Sitnikovproblems 7. Ordnung in $z \cdot e$:

Implementation in SDS: **PolynomialEquation[n]**

(Die Sortierung der Terme erfolgt von großer zu kleiner Potenz.)

$$z'' - 1120\,z^7 + ((4200\cos(2\,t) + 2520)\,e^2 + 1680\cos(t)\,e + 240)\,z^5 + ((-1240\cos(2\,t) - 1490\cos(4\,t) - 630)\,e^4 + (-810\cos(t) - 870\cos(3\,t))\,e^3 + (-480\cos(2\,t) - 240)\,e^2 - 240\cos(t)\,e - 48)\,z^3 + \left(\left(\frac{141}{4}\cos(2\,t) + \frac{129}{10}\cos(4\,t) + \frac{3167}{20}\cos(6\,t) + \frac{35}{2}\right)e^6 + \left(\frac{261\cos(t)}{8} + \frac{393}{16}\cos(3\,t) + \frac{1773}{16}\cos(5\,t)\right)e^5 + (28\cos(2\,t) + 77\cos(4\,t) + 15)\,e^4 + (27\cos(t) + 53\cos(3\,t))\,e^3 + (36\cos(2\,t) + 12)\,e^2 + 24\cos(t)\,e + 8\right)z = 0$$

▪ Courant & Snyder transformierte Bewegungsgleichung des Sitnikovproblems, 7. Ordnung in $y \cdot e$:

Implementation in SDS:
CourantSnyderTransformedA[n], CourantSnyderTransformedB[n]

(Die Sortierung der Terme erfolgt von großer zu kleiner Potenz)

CourantSnyderTransformedA:

$$-1120\, y^7\, w(t(\psi))^{10} + ((4200\cos(2t)+2520)\,e^2 + 1680\cos(t)\,e + 240)\, y^5\, w(t(\psi))^8 + ((-1240\cos(2t) - 1490\cos(4t) - 630)\,e^4 + (-810\cos(t) - 870\cos(3t))\,e^3 + (-480\cos(2t)-240)\,e^2 - 240\cos(t)\,e - 48)\, y^3\, w(t(\psi))^6 + y + y'' = 0$$

CourantSnyderTransformedB:

$$-\frac{35\, y^7}{4\sqrt{2}} + \left(\frac{(3530291160\cos(2t)+676351800)\,e^2}{1359422912} + \frac{375}{124}\cos(t)\,e + \frac{15}{4}\right)y^5 + \left(\frac{1}{1359422912}\left(\left(-93062800\sqrt{2}\cos(2t) - 374314088\sqrt{2}\cos(4t) - 5742801\sqrt{2}\right)e^4\right) + \frac{\left(-125901540\sqrt{2}\cos(t) - 411354996\sqrt{2}\cos(3t)\right)e^3}{1359422912} + \frac{\left(-492278016\sqrt{2}\cos(2t) - 145879800\sqrt{2}\right)e^2}{1359422912} - \frac{33\cos(t)\,e}{31\sqrt{2}} - \frac{3}{\sqrt{2}}\right)y^3 + y + y'' = 0$$

wobei $t = t(\psi)$

■ Inverse Phasenfunktion t(ψ), 7.Ordnung in e:

Implementation in SDS: **InversePhaseFunction[n]**

$$t = \frac{\psi}{2\sqrt{2}} - \frac{48}{31}\sin\left(\frac{\psi}{2\sqrt{2}}\right)e + \left(\frac{297}{961}\sin\left(\frac{\psi}{\sqrt{2}}\right) - \frac{21\psi}{248\sqrt{2}}\right)e^2 + \left(\frac{63}{961}\sqrt{2}\,\psi\cos\left(\frac{\psi}{2\sqrt{2}}\right) - \frac{1422\sin\left(\frac{\psi}{2\sqrt{2}}\right)}{29791} - \frac{117646\sin\left(\frac{3\psi}{2\sqrt{2}}\right)}{2055579}\right)e^3 + \left(-\frac{6237\cos\left(\frac{\psi}{\sqrt{2}}\right)\psi}{119164\sqrt{2}} - \frac{62265\,\psi}{1906624\sqrt{2}} + \frac{1622037\sin\left(\frac{\psi}{\sqrt{2}}\right)}{21240983} + \frac{6425283\sin\left(\sqrt{2}\,\psi\right)}{679711456}\right)e^4 + \left(\frac{100863\,\psi\cos\left(\frac{\psi}{2\sqrt{2}}\right)}{1847042\sqrt{2}} + \frac{1235283\,\psi\cos\left(\frac{3\psi}{2\sqrt{2}}\right)}{84963932\sqrt{2}} + \left(\frac{1323\,\psi^2}{476656} - \frac{83934411}{2633881892}\right)\sin\left(\frac{\psi}{2\sqrt{2}}\right) - \frac{3581751713\sin\left(\frac{3\psi}{2\sqrt{2}}\right)}{121158567032} - \frac{36613221\sin\left(\frac{5\psi}{2\sqrt{2}}\right)}{26338818920}\right)e^5 + \left(-\frac{697834431\cos\left(\frac{\psi}{\sqrt{2}}\right)\psi}{21071055136\sqrt{2}} - \frac{134930943\cos\left(\sqrt{2}\,\psi\right)\psi}{42142110272\sqrt{2}} - \frac{3194917761\,\psi}{168568441088\sqrt{2}} + \left(\frac{637018246647}{15023662311968} - \frac{130977\,\psi^2}{59105344}\right)\sin\left(\frac{\psi}{\sqrt{2}}\right) + \frac{39539136257\sin\left(\frac{3\psi}{\sqrt{2}}\right)}{225354934679520} + \frac{1161823875993\sin\left(\sqrt{2}\,\psi\right)}{150236623119680}\right)e^6 + \left(\left(\frac{10975174371\,\psi}{326601354608\sqrt{2}} - \frac{9261\,\psi^3}{118210688\sqrt{2}}\right)\cos\left(\frac{\psi}{2\sqrt{2}}\right) + \frac{394130606289\,\psi\cos\left(\frac{3\psi}{2\sqrt{2}}\right)}{30047324623936\sqrt{2}} + \frac{768877641\,\psi\cos\left(\frac{5\psi}{2\sqrt{2}}\right)}{1306405418432\sqrt{2}} + \left(\frac{8158941\,\psi^2}{3664531328} - \frac{20381934260133}{931467063342016}\right)\sin\left(\frac{\psi}{2\sqrt{2}}\right) + \left(\frac{77822829\,\psi^2}{84284220544} - \frac{2156438803461467}{107118712284331840}\right)\sin\left(\frac{3\psi}{2\sqrt{2}}\right) - \frac{7637236509081\sin\left(\frac{5\psi}{2\sqrt{2}}\right)}{4657335316710080} - \frac{9581912747811\sin\left(\frac{7\psi}{2\sqrt{2}}\right)}{554222902688499520}\right)e^7 + O(e^8)$$

■ Die Tau - Transformierte Bewegungsgleichung des Sitnikovproblems, 7.Ordnung in λ:

Implementation in SDS: **TauTransformed[n]**

(Die Sortierung der Terme erfolgt von großer zu kleiner Potenz)

$$\left(-35\sqrt{2}\,y^7+\left(\frac{19965}{961}\cos(2\tau)+\frac{3825}{961}\right)e^2 y^5+\left(-\frac{11632850\sqrt{2}\cos(2\tau)}{21240983}-\frac{1509331\sqrt{2}\cos(4\tau)}{685193}-\frac{249687}{3694084\sqrt{2}}\right)e^4 y^3\right)\lambda^7+$$
$$\left(\frac{750}{31}e\cos(\tau)y^5+\left(-\frac{44145\cos(\tau)}{29791\sqrt{2}}-\frac{3317379\cos(3\tau)}{685193\sqrt{2}}\right)e^3 y^3\right)\lambda^6+$$
$$\left(30y^5+\left(\frac{1}{961}\sqrt{2}\,(-2784)\cos(2\tau)-\frac{825\sqrt{2}}{961}\right)e^2 y^3\right)\lambda^5-$$
$$\frac{132}{31}\sqrt{2}\,e\,y^3\cos(\tau)\lambda^4-12\sqrt{2}\,y^3\lambda^3+8y+y''=0$$

■ Die Ordnungen λ^6 und λ^7 der Lösung des Sitnikov Problems

Implementation in SDS: **MPLExpansion[n,n], NonlinearSolution[n,n]**

$$D=C_1^2+C_2^2$$

$$\mathrm{T}_6(\sigma)=\frac{459}{512}D^2\sigma$$

$$\mathrm{T}_7(\sigma)=\frac{D\left(1498122\sqrt{2}\,e^4-147033000\,D\,e^2+1131313225\sqrt{2}\,D^2\right)}{945685504}\sigma$$

$$y_6(\sigma)=\frac{3317379\,\mathrm{E}_{1,2}\,e^3}{5481544\sqrt{2}\left(-73+36\sqrt{2}\right)}\cos\left(3\sigma-6\sqrt{2}\,\sigma\right)+\frac{3317379\,\mathrm{E}_{2,1}\,e^3\sin\left(6\sqrt{2}\,\sigma+3\sigma\right)}{5481544\sqrt{2}\left(73+36\sqrt{2}\right)}+$$
$$\frac{3317379\,\mathrm{E}_{2,1}\,e^3\sin\left(3\sigma-6\sqrt{2}\,\sigma\right)}{5481544\sqrt{2}\left(-73+36\sqrt{2}\right)}-\frac{3317379\,C_2\,e^3\,D\sin\left(3\sigma-2\sqrt{2}\,\sigma\right)}{5481544\sqrt{2}\left(-3+4\sqrt{2}\right)}-$$
$$\frac{3317379\,C_1\,e^3\,D\cos\left(2\sqrt{2}\,\sigma+3\sigma\right)}{5481544\sqrt{2}\left(3+4\sqrt{2}\right)}-\frac{3317379\,C_2\,e^3\,D\sin\left(2\sqrt{2}\,\sigma+3\sigma\right)}{5481544\sqrt{2}\left(3+4\sqrt{2}\right)}-$$
$$\frac{3317379\,\mathrm{E}_{1,2}\,e^3\cos\left(6\sqrt{2}\,\sigma+3\sigma\right)}{5481544\sqrt{2}\left(73+36\sqrt{2}\right)}+\frac{15\left(2943\sqrt{2}\,e^2-120125\,D\right)\mathrm{E}_{1,2}\,e}{476656\left(-65+12\sqrt{2}\right)}\cos\left(\sigma-6\sqrt{2}\,\sigma\right)+$$
$$\frac{15\left(2943\sqrt{2}\,e^2-120125\,D\right)\mathrm{E}_{2,1}\,e}{476656\left(65+12\sqrt{2}\right)}\sin\left(6\sqrt{2}\,\sigma+\sigma\right)+\frac{15\left(2943\sqrt{2}\,e^2-120125\,D\right)\mathrm{E}_{2,1}\,e}{476656\left(-65+12\sqrt{2}\right)}\sin\left(\sigma-6\sqrt{2}\,\sigma\right)+$$
$$\frac{375\,F_{1,2}\,e\cos\left(10\sqrt{2}\,\sigma+\sigma\right)}{496\left(193+20\sqrt{2}\right)}+\frac{375\,F_{2,1}\,e\sin\left(10\sqrt{2}\,\sigma+\sigma\right)}{496\left(193+20\sqrt{2}\right)}+$$
$$\frac{375\,F_{2,1}\,e\sin\left(\sigma-10\sqrt{2}\,\sigma\right)}{496\left(-193+20\sqrt{2}\right)}-\frac{15\,D\left(8829\sqrt{2}\,e^2-240250\,D\right)C_2\,e\sin\left(\sigma-2\sqrt{2}\,\sigma\right)}{476656\left(-1+4\sqrt{2}\right)}-$$
$$\frac{15\,D\left(8829\sqrt{2}\,e^2-240250\,D\right)C_1\,e\cos\left(2\sqrt{2}\,\sigma+\sigma\right)}{476656\left(1+4\sqrt{2}\right)}-$$

$$\frac{15\,D\left(8829\sqrt{2}\,e^2-240250\,D\right)C_2\,e\sin\left(2\sqrt{2}\,\sigma+\sigma\right)}{476656\left(1+4\sqrt{2}\right)}-$$

$$\frac{15\left(2943\sqrt{2}\,e^2-120125\,D\right)\mathrm{E}_{1,2}\,e\cos\left(6\sqrt{2}\,\sigma+\sigma\right)}{476656\left(65+12\sqrt{2}\right)}-\frac{375\,F_{1,2}\,\mathrm{e}\cos\left(\sigma-10\sqrt{2}\,\sigma\right)}{496\left(-193+20\sqrt{2}\right)}+$$

$$\frac{\left(15\,C_1\,D\,e\left(8829\sqrt{2}\,e^2-240250\,D\right)\right)\cos\left(\sigma-2\sqrt{2}\,\sigma\right)}{476656\left(-1+4\sqrt{2}\right)}+\frac{(3317379\,C_1\,D\,e^3)\cos\left(3\,\sigma-2\sqrt{2}\,\sigma\right)}{5481544\sqrt{2}\left(-3+4\sqrt{2}\right)}+$$

$$\frac{9\,H_{1,2}\sin\left(10\sqrt{2}\,\sigma\right)}{2048}+\frac{9\,H_{2,1}\cos\left(10\sqrt{2}\,\sigma\right)}{2048}-\frac{189\,G_{2,1}\cos\left(6\sqrt{2}\,\sigma\right)}{2048}-\frac{189\,G_{1,2}\sin\left(6\sqrt{2}\,\sigma\right)}{2048}$$

$$y_7(\sigma)==\frac{4527993\,c_1\,(c_1^2+c_2^2)\cos\left(4\,\sigma-2\sqrt{2}\,\sigma\right)e^4}{43852352\sqrt{2}\left(-1+\sqrt{2}\right)}+\frac{1509331\,c_1\,(c_1^2-3\,c_2^2)\cos\left(4\,\sigma-6\sqrt{2}\,\sigma\right)e^4}{43852352\sqrt{2}\left(-5+3\sqrt{2}\right)}+$$

$$\frac{1509331\,c_2\,(c_2^2-3\,c_1^2)\sin\left(6\sqrt{2}\,\sigma+4\,\sigma\right)e^4}{43852352\sqrt{2}\left(5+3\sqrt{2}\right)}+\frac{1509331\,c_2\,(c_2^2-3\,c_1^2)\sin\left(4\,\sigma-6\sqrt{2}\,\sigma\right)e^4}{43852352\sqrt{2}\left(-5+3\sqrt{2}\right)}-$$

$$\frac{4527993\,c_2\,(c_1^2+c_2^2)\sin\left(4\,\sigma-2\sqrt{2}\,\sigma\right)e^4}{43852352\sqrt{2}\left(-1+\sqrt{2}\right)}-\frac{4527993\,c_1\,(c_1^2+c_2^2)\cos\left(2\sqrt{2}\,\sigma+4\,\sigma\right)e^4}{43852352\sqrt{2}\left(1+\sqrt{2}\right)}-$$

$$\frac{4527993\,c_2\,(c_1^2+c_2^2)\sin\left(2\sqrt{2}\,\sigma+4\,\sigma\right)e^4}{43852352\sqrt{2}\left(1+\sqrt{2}\right)}-\frac{1509331\,c_1\,(c_1^2-3\,c_2^2)\cos\left(6\sqrt{2}\,\sigma+4\,\sigma\right)e^4}{43852352\sqrt{2}\left(5+3\sqrt{2}\right)}-\frac{1}{3782742016}$$

$$\left(3\,c_1\,(c_1^2-3\,c_2^2)\left(166458\sqrt{2}\,e^4-24505500\,(c_1^2+c_2^2)\,e^2+226262645\sqrt{2}\,(c_1^2+c_2^2)^2\right)\cos\left(6\sqrt{2}\,\sigma\right)\right)+$$

$$\frac{5\,c_1\,(c_1^4-10\,c_2^2\,c_1^2+5\,c_2^4)\left(3060\,e^2-47089\sqrt{2}\,(c_1^2+c_2^2)\right)\cos\left(10\sqrt{2}\,\sigma\right)}{11808768}-$$

$$\frac{35\,c_1\,(c_1^6-21\,c_2^2\,c_1^4+35\,c_2^4\,c_1^2-7\,c_2^6)\cos\left(14\sqrt{2}\,\sigma\right)}{12288\sqrt{2}}+$$

$$\frac{297\left(-21923+48384\sqrt{2}\right)e\,c_1\,(c_1^4-2\,c_2^2\,c_1^2-3\,c_2^4)\cos\left(6\sqrt{2}\,\sigma+\sigma\right)}{3905504\left(65+12\sqrt{2}\right)}+$$

$$\frac{19965\,e^2\,c_1\,(c_1^4-10\,c_2^2\,c_1^2+5\,c_2^4)\cos\left(10\sqrt{2}\,\sigma+2\,\sigma\right)}{123008\left(49+10\sqrt{2}\right)}+$$

$$\frac{75\,e^2\,c_1\,(c_1^2+c_2^2)\left(930628\sqrt{2}\,e^2-29419093\,(c_1^2+c_2^2)\right)\cos\left(2\,\sigma-2\sqrt{2}\,\sigma\right)}{1359422912\left(-1+2\sqrt{2}\right)}+$$

$$\frac{297\left(21923+48384\sqrt{2}\right)e\,c_1\,(c_1^4-2\,c_2^2\,c_1^2-3\,c_2^4)\cos\left(\sigma-6\sqrt{2}\,\sigma\right)}{3905504\left(-65+12\sqrt{2}\right)}+$$

$$\frac{25\,e^2\,c_1\,(c_1^2-3\,c_2^2)\left(1861256\sqrt{2}\,e^2-88257279\,(c_1^2+c_2^2)\right)\cos\left(2\,\sigma-6\sqrt{2}\,\sigma\right)}{2718845824\left(-17+6\sqrt{2}\right)}+\frac{1}{3782742016}$$

$$\left(3\,c_2\,(c_2^2-3\,c_1^2)\left(166458\sqrt{2}\,e^4-24505500\,(c_1^2+c_2^2)\,e^2+226262645\sqrt{2}\,(c_1^2+c_2^2)^2\right)\sin\left(6\sqrt{2}\,\sigma\right)\right)+$$

$$\frac{5\,c_2\,(5\,c_1^4-10\,c_2^2\,c_1^2+c_2^4)\left(3060\,e^2-47089\sqrt{2}\,(c_1^2+c_2^2)\right)\sin\left(10\sqrt{2}\,\sigma\right)}{11808768}+$$

$$\frac{35\,c_2\,(-7\,c_1^6+35\,c_2^2\,c_1^4-21\,c_2^4\,c_1^2+c_2^6)\sin\left(14\sqrt{2}\,\sigma\right)}{12288\sqrt{2}}+$$

$$\frac{25\,e^2\,c_2\,(c_2^2-3\,c_1^2)\left(1861256\sqrt{2}\,e^2-88257279\,(c_1^2+c_2^2)\right)\sin\left(6\sqrt{2}\,\sigma+2\,\sigma\right)}{2718845824\left(17+6\sqrt{2}\right)}+$$

$$\frac{19965\,e^2\,c_2\,(5\,c_1^4-10\,c_2^2\,c_1^2+c_2^4)\sin\left(10\sqrt{2}\,\sigma+2\,\sigma\right)}{123008\left(49+10\sqrt{2}\right)}+$$

$$\frac{891\left(-45053+256\sqrt{2}\right)e\,c_2\,(c_1^2+c_2^2)^2\sin\left(\sigma-2\sqrt{2}\,\sigma\right)}{7811008\left(-1+4\sqrt{2}\right)}+$$
$$\frac{297\left(21923+48384\sqrt{2}\right)e\,c_2\,(-3\,c_1^4-2\,c_2^2\,c_1^2+c_2^4)\sin\left(\sigma-6\sqrt{2}\,\sigma\right)}{3905504\left(-65+12\sqrt{2}\right)}+$$
$$\frac{25\,e^2\,c_2\,(c_2^2-3\,c_1^2)\left(1861256\sqrt{2}\,e^2-88257279\,(c_1^2+c_2^2)\right)\sin\left(2\,\sigma-6\sqrt{2}\,\sigma\right)}{2718845824\left(-17+6\sqrt{2}\right)}+$$
$$\frac{891\left(2699+256\sqrt{2}\right)e\,c_2\,(5\,c_1^4-10\,c_2^2\,c_1^2+c_2^4)\sin\left(\sigma-10\sqrt{2}\,\sigma\right)}{7811008\left(-193+20\sqrt{2}\right)}+$$
$$\frac{19965\,e^2\,c_2\,(5\,c_1^4-10\,c_2^2\,c_1^2+c_2^4)\sin\left(2\,\sigma-10\sqrt{2}\,\sigma\right)}{123008\left(-49+10\sqrt{2}\right)}-$$
$$\frac{75\,e^2\,c_2\,(c_1^2+c_2^2)\left(930628\sqrt{2}\,e^2-29419093\,(c_1^2+c_2^2)\right)\sin\left(2\,\sigma-2\sqrt{2}\,\sigma\right)}{1359422912\left(-1+2\sqrt{2}\right)}-$$
$$\frac{75\,e^2\,c_1\,(c_1^2+c_2^2)\left(930628\sqrt{2}\,e^2-29419093\,(c_1^2+c_2^2)\right)\cos\left(2\sqrt{2}\,\sigma+2\,\sigma\right)}{1359422912\left(1+2\sqrt{2}\right)}-$$
$$\frac{75\,e^2\,c_2\,(c_1^2+c_2^2)\left(930628\sqrt{2}\,e^2-29419093\,(c_1^2+c_2^2)\right)\sin\left(2\sqrt{2}\,\sigma+2\,\sigma\right)}{1359422912\left(1+2\sqrt{2}\right)}-$$
$$\frac{891\left(-45053+256\sqrt{2}\right)e\,c_1\,(c_1^2+c_2^2)^2\cos\left(\sigma-2\sqrt{2}\,\sigma\right)}{7811008\left(-1+4\sqrt{2}\right)}-$$
$$\frac{891\left(45053+256\sqrt{2}\right)e\,c_1\,(c_1^2+c_2^2)^2\cos\left(2\sqrt{2}\,\sigma+\sigma\right)}{7811008\left(1+4\sqrt{2}\right)}-$$
$$\frac{891\left(45053+256\sqrt{2}\right)e\,c_2\,(c_1^2+c_2^2)^2\sin\left(2\sqrt{2}\,\sigma+\sigma\right)}{7811008\left(1+4\sqrt{2}\right)}-$$
$$\frac{25\,e^2\,c_1\,(c_1^2-3\,c_2^2)\left(1861256\sqrt{2}\,e^2-88257279\,(c_1^2+c_2^2)\right)\cos\left(6\sqrt{2}\,\sigma+2\,\sigma\right)}{2718845824\left(17+6\sqrt{2}\right)}-$$
$$\frac{19965\,e^2\,c_1\,(c_1^4-10\,c_2^2\,c_1^2+5\,c_2^4)\cos\left(2\,\sigma-10\sqrt{2}\,\sigma\right)}{123008\left(-49+10\sqrt{2}\right)}-$$
$$\frac{297\left(-21923+48384\sqrt{2}\right)e\,c_2\,(-3\,c_1^4-2\,c_2^2\,c_1^2+c_2^4)\sin\left(6\sqrt{2}\,\sigma+\sigma\right)}{3905504\left(65+12\sqrt{2}\right)}-$$
$$\frac{891\left(2699+256\sqrt{2}\right)e\,c_1\,(c_1^4-10\,c_2^2\,c_1^2+5\,c_2^4)\cos\left(\sigma-10\sqrt{2}\,\sigma\right)}{7811008\left(-193+20\sqrt{2}\right)}-$$
$$\frac{891\left(-2699+256\sqrt{2}\right)e\,c_1\,(c_1^4-10\,c_2^2\,c_1^2+5\,c_2^4)\cos\left(10\sqrt{2}\,\sigma+\sigma\right)}{7811008\left(193+20\sqrt{2}\right)}-$$
$$\frac{891\left(-2699+256\sqrt{2}\right)e\,c_2\,(5\,c_1^4-10\,c_2^2\,c_1^2+c_2^4)\sin\left(10\sqrt{2}\,\sigma+\sigma\right)}{7811008\left(193+20\sqrt{2}\right)}$$

- **Die Amplitudenfunktionen der Lösung A_k, B_k**

  Implementation in SDS: **Solution´A[k], Solution´B[k]**

$$A_1 = \left(\frac{1}{2^{3/4}} + \frac{2805\, e^2}{7688\, 2^{3/4}} + \frac{720921\, e^4}{118210688\, 2^{3/4}} + \frac{567253678047\, e^6}{480757193982976\, 2^{3/4}} + \left(-\frac{12}{31}\, 2^{1/4}\, e + \frac{4725\, 2^{1/4}\, e^3}{29791} - \frac{164709933\, e^5}{10535527568\, 2^{3/4}}\right)\mathrm{Cos}[t] + \left(-\frac{423\, e^2}{961\, 2^{3/4}} + \frac{51488435\, e^4}{169927864\, 2^{3/4}} - \frac{3115519619475\, e^6}{60094649247872\, 2^{3/4}}\right)\mathrm{Cos}[2\,t] + \left(-\frac{242639\, e^3}{685193\, 2^{3/4}} + \frac{81478484721\, e^5}{242317134064\, 2^{3/4}}\right)\mathrm{Cos}[3\,t] + \left(-\frac{112233097\, e^4}{339855728\, 2^{3/4}} + \frac{119481371612061\, e^6}{300473246239360\, 2^{3/4}}\right)\mathrm{Cos}[4\,t] - \frac{3522692847\, e^5\, \mathrm{Cos}[5\,t]}{10535527568\, 2^{3/4}} - \frac{26800521248289\, e^6\, \mathrm{Cos}[6\,t]}{75118311559840\, 2^{3/4}}\right) C_{\mathrm{i}}$$

$$A_2 = C_{\mathrm{i}}\left(-\frac{3}{64\, 2^{1/4}} - \frac{10065\, e^2}{492032\, 2^{1/4}} - \frac{400581\, e^4}{244047872\, 2^{1/4}} + \left(\frac{1269\, e^2}{61504\, 2^{1/4}} - \frac{138412455\, e^4}{10875383296\, 2^{1/4}}\right)\mathrm{Cos}[2\,t] + \mathrm{Cos}[t]\left(\frac{9\, e}{248\, 2^{1/4}} - \frac{1266117\, e^3}{43852352\, 2^{1/4}} + \frac{727917\, e^3\, \mathrm{Cos}[2\,t]}{21926176\, 2^{1/4}}\right) + \frac{336699291\, e^4\, \mathrm{Cos}[4\,t]}{21750766592\, 2^{1/4}} + \left(\frac{111}{2048\, 2^{3/4}} + \frac{617355\, e^2}{15745024\, 2^{3/4}} - \frac{333\, e\, \mathrm{Cos}[t]}{7936\, 2^{3/4}} - \frac{46953\, e^2\, \mathrm{Cos}[2\,t]}{1968128\, 2^{3/4}}\right) K_2 - \frac{735\, K_2^2}{4096\, 2^{1/4}}\right) M_1$$

$$A_3 = C_{\mathrm{i}}\left(\frac{29}{2048\, 2^{3/4}} + \frac{101745\, e^2}{15745024\, 2^{3/4}} - \frac{87\, e\, \mathrm{Cos}[t]}{7936\, 2^{3/4}} - \frac{12267\, e^2\, \mathrm{Cos}[2\,t]}{1968128\, 2^{3/4}} - \frac{245\, K_2}{12288\, 2^{1/4}}\right) M_2$$

$$A_4 = -\frac{35\, M_3}{24576\, 2^{1/4}}$$

$$A_5 = \left(\frac{3\left(2770103 + 76032\,\sqrt{2}\right) e}{7811008\, 2^{3/4}\left(193 - 20\,\sqrt{2}\right)} + \frac{9\left(2770103 + 76032\,\sqrt{2}\right) e^2\, \mathrm{Cos}[t]}{30267656\, 2^{3/4}\left(-193 + 20\,\sqrt{2}\right)}\right) C_{\mathrm{i}}\, M_2$$

$$A_6 = \frac{19965\left(49 + 10\,\sqrt{2}\right) e^2\, C_{\mathrm{i}}\, M_2}{270740608\, 2^{3/4}}$$

$$A_7 = C_{\mathrm{i}}\left(-\frac{33\left(24 + 65\,\sqrt{2}\right) e}{244094\, 2^{3/4}} + \frac{2205\, e^3}{7688\, 2^{1/4}\left(-65 + 12\,\sqrt{2}\right)} - \frac{13959\, e^3\, \mathrm{Cos}[2\,t]}{59582\, 2^{1/4}\left(-65 + 12\,\sqrt{2}\right)} + \mathrm{Cos}[t]\left(\frac{198\, 2^{1/4}\left(24 + 65\,\sqrt{2}\right) e^2}{3783457} + \frac{3033408\, 2^{3/4}\, e^4}{21240983\left(-65 + 12\,\sqrt{2}\right)} - \frac{8007087\, e^4\, \mathrm{Cos}[2\,t]}{21240983\, 2^{1/4}\left(-65 + 12\,\sqrt{2}\right)}\right) + \left(\frac{3\left(-2750873 + 4790016\,\sqrt{2}\right) e}{3905504\, 2^{3/4}\left(-65 + 12\,\sqrt{2}\right)} - \frac{9\left(-2750873 + 4790016\,\sqrt{2}\right) e^2\, \mathrm{Cos}[t]}{15133828\, 2^{3/4}\left(-65 + 12\,\sqrt{2}\right)}\right) K_2\right) M_1$$

$$A_8 = C_{\mathrm{i}}\left(-\frac{87\left(12 + 17\,\sqrt{2}\right) e^2}{208537\, 2^{3/4}} + \frac{17042035\, e^4}{339855728\, 2^{1/4}\left(-17 + 6\,\sqrt{2}\right)} + \frac{1044\, 2^{1/4}\left(12 + 17\,\sqrt{2}\right) e^3\, \mathrm{Cos}[t]}{6464647} - \frac{36801\, e^4\, \mathrm{Cos}[2\,t]}{923521\, 2^{1/4}\left(-17 + 6\,\sqrt{2}\right)} - \frac{99825\, e^2\, K_2}{123008\, 2^{3/4}\left(-17 + 6\,\sqrt{2}\right)}\right) M_1$$

$$A_9 = \left(-\frac{3317379\, e^3}{5481544\, 2^{3/4}\left(-72 + 73\,\sqrt{2}\right)} + \frac{9952137\, e^4\, \mathrm{Cos}[t]}{21240983\, 2^{3/4}\left(-72 + 73\,\sqrt{2}\right)}\right) C_{\mathrm{i}}\, M_1$$

$$A_{10} = -\frac{1509331\left(6 + 5\,\sqrt{2}\right) e^4\, C_{\mathrm{i}}\, M_1}{613932928\, 2^{3/4}}$$

$$A_{11} = C_{\rm i}\left(\left(\frac{99\left(8+\sqrt{2}\right)e}{1922\,2^{3/4}} + \frac{6615\,e^3}{7688\,2^{1/4}\left(-1+4\sqrt{2}\right)} - \frac{41877\,e^3\,\mathrm{Cos}[2\,t]}{59582\,2^{1/4}\left(-1+4\sqrt{2}\right)} + \mathrm{Cos}[t]\left(-\frac{594\,2^{1/4}\left(8+\sqrt{2}\right)e^2}{29791} + \frac{9100224\,2^{3/4}\,e^4}{21240983\left(-1+4\sqrt{2}\right)} - \frac{24021261\,e^4\,\mathrm{Cos}[2\,t]}{21240983\,2^{1/4}\left(-1+4\sqrt{2}\right)}\right)\right)K_2 + \left(-\frac{3\left(6304259+76032\sqrt{2}\right)e}{7811008\,2^{3/4}\left(-1+4\sqrt{2}\right)} + \frac{9\left(6304259+76032\sqrt{2}\right)e^2\,\mathrm{Cos}[t]}{30267656\,2^{3/4}\left(-1+4\sqrt{2}\right)}\right)K_2^2\right)$$

$$A_{12} = C_{\rm i}\left(\left(\frac{261\left(4+\sqrt{2}\right)e^2}{6727\,2^{3/4}} + \frac{51126105\left(4+\sqrt{2}\right)e^4}{2378990096\,2^{3/4}} - \frac{3132\,2^{1/4}\left(4+\sqrt{2}\right)e^3\,\mathrm{Cos}[t]}{208537} - \frac{110403\left(4+\sqrt{2}\right)e^4\,\mathrm{Cos}[2\,t]}{6464647\,2^{3/4}}\right)K_2 - \frac{99825\left(1+2\sqrt{2}\right)e^2\,K_2^2}{430528\,2^{3/4}}\right)$$

$$A_{13} = \left(\frac{3317379\left(8+3\sqrt{2}\right)e^3}{252151024\,2^{3/4}} - \frac{9952137\left(8+3\sqrt{2}\right)e^4\,\mathrm{Cos}[t]}{977085218\,2^{3/4}}\right)C_{\rm i}\,K_2$$

$$A_{14} = \frac{4527993\left(2+\sqrt{2}\right)e^4\,C_{\rm i}\,K_2}{87704704\,2^{3/4}}$$

$$A_{15} = C_{\rm i}\left(\left(\frac{99\left(-8+\sqrt{2}\right)e}{1922\,2^{3/4}} - \frac{6615\,e^3}{7688\,2^{1/4}\left(1+4\sqrt{2}\right)} + \frac{41877\,e^3\,\mathrm{Cos}[2\,t]}{59582\,2^{1/4}\left(1+4\sqrt{2}\right)} + \mathrm{Cos}[t]\left(-\frac{594\,2^{1/4}\left(-8+\sqrt{2}\right)e^2}{29791} - \frac{9100224\,2^{3/4}\,e^4}{21240983\left(1+4\sqrt{2}\right)} + \frac{24021261\,e^4\,\mathrm{Cos}[2\,t]}{21240983\,2^{1/4}\left(1+4\sqrt{2}\right)}\right)\right)K_2 + \left(\frac{3\left(6304259-76032\sqrt{2}\right)e}{7811008\,2^{3/4}\left(1+4\sqrt{2}\right)} + \frac{9\left(-6304259+76032\sqrt{2}\right)e^2\,\mathrm{Cos}[t]}{30267656\,2^{3/4}\left(1+4\sqrt{2}\right)}\right)K_2^2\right)$$

$$A_{16} = C_{\rm i}\left(\left(\frac{261\left(-4+\sqrt{2}\right)e^2}{6727\,2^{3/4}} - \frac{51126105\,e^4}{339855728\,2^{1/4}\left(1+2\sqrt{2}\right)} - \frac{3132\,2^{1/4}\left(-4+\sqrt{2}\right)e^3\,\mathrm{Cos}[t]}{208537} + \frac{110403\,e^4\,\mathrm{Cos}[2\,t]}{923521\,2^{1/4}\left(1+2\sqrt{2}\right)}\right)K_2 + \frac{99825\,e^2\,K_2^2}{61504\,2^{3/4}\left(1+2\sqrt{2}\right)}\right)$$

$$A_{17} = \left(\frac{3317379\left(-8+3\sqrt{2}\right)e^3}{252151024\,2^{3/4}} - \frac{9952137\left(-8+3\sqrt{2}\right)e^4\,\mathrm{Cos}[t]}{977085218\,2^{3/4}}\right)C_{\rm i}\,K_2$$

$$A_{18} = \frac{4527993\left(-2+\sqrt{2}\right)e^4\,C_{\rm i}\,K_2}{87704704\,2^{3/4}}$$

$$A_{19} = C_{\rm i}\left(-\frac{33\left(-24+65\sqrt{2}\right)e}{244094\,2^{3/4}} - \frac{2205\,e^3}{7688\,2^{1/4}\left(65+12\sqrt{2}\right)} + \frac{13959\,e^3\,\mathrm{Cos}[2\,t]}{59582\,2^{1/4}\left(65+12\sqrt{2}\right)} + \mathrm{Cos}[t]\left(\frac{198\,2^{1/4}\left(-24+65\sqrt{2}\right)e^2}{3783457} - \frac{3033408\,2^{3/4}\,e^4}{21240983\left(65+12\sqrt{2}\right)} + \frac{8007087\,e^4\,\mathrm{Cos}[2\,t]}{21240983\,2^{1/4}\left(65+12\sqrt{2}\right)}\right) + \left(\frac{3\left(2750873+4790016\sqrt{2}\right)e}{3905504\,2^{3/4}\left(65+12\sqrt{2}\right)} - \frac{9\left(2750873+4790016\sqrt{2}\right)e^2\,\mathrm{Cos}[t]}{15133828\,2^{3/4}\left(65+12\sqrt{2}\right)}\right)K_2\right)M_1$$

$$A_{20} = C_{\text{i}} \left(\frac{87 \left(12 - 17 \sqrt{2}\right) e^2}{208537\, 2^{3/4}} - \frac{17042035\, e^4}{339855728\, 2^{1/4} \left(17 + 6 \sqrt{2}\right)} + \frac{1044\, 2^{1/4} \left(-12 + 17 \sqrt{2}\right) e^3 \operatorname{Cos}[t]}{6464647} + \frac{36801\, e^4 \operatorname{Cos}[2\, t]}{923521\, 2^{1/4} \left(17 + 6 \sqrt{2}\right)} + \frac{99825\, e^2 K_2}{123008\, 2^{3/4} \left(17 + 6 \sqrt{2}\right)} \right) M_1$$

$$A_{21} = \left(- \frac{3317379\, e^3}{5481544\, 2^{3/4} \left(72 + 73 \sqrt{2}\right)} + \frac{9952137\, e^4 \operatorname{Cos}[t]}{21240983\, 2^{3/4} \left(72 + 73 \sqrt{2}\right)} \right) C_{\text{i}} M_1$$

$$A_{22} = - \frac{1509331 \left(-6 + 5 \sqrt{2}\right) e^4 C_{\text{i}} M_1}{613932928\, 2^{3/4}}$$

$$A_{23} = \left(- \frac{3 \left(-2770103 + 76032 \sqrt{2}\right) e}{7811008\, 2^{3/4} \left(193 + 20 \sqrt{2}\right)} + \frac{9 \left(-2770103 + 76032 \sqrt{2}\right) e^2 \operatorname{Cos}[t]}{30267656\, 2^{3/4} \left(193 + 20 \sqrt{2}\right)} \right) C_{\text{i}} M_2$$

$$A_{24} = \frac{19965\, e^2 C_{\text{i}} M_2}{123008\, 2^{3/4} \left(49 + 10 \sqrt{2}\right)}$$

$$B_k = \operatorname{sgn}(k) * A_k$$

wobei sgn(k) das k-te element der folgenden Reihe ist:

$$1, -1, 1, -1, -1, -1, 1, 1, 1, 1, -1, -1, -1, -1, 1, 1, 1, 1, -1, -1, -1, -1, 1, 1, \ldots$$

■ Die Phasenfunktionen der Lösung ψ_k

Implementation in SDS: **Solution´Psi[k], Sigma[n]**

ψ_k ist das k-te Element der Reihe

$$2 \sqrt{2}\, \sigma,\ 6 \sqrt{2}\, \sigma,\ 10 \sqrt{2}\, \sigma,\ 14 \sqrt{2}\, \sigma,\ \sigma - 10 \sqrt{2}\, \sigma,\ 2 \sigma - 10 \sqrt{2}\, \sigma,\ \sigma - 6 \sqrt{2}\, \sigma,\ 2 \sigma - 6 \sqrt{2}\, \sigma,\ 3 \sigma - 6 \sqrt{2}\, \sigma,\ 4 \sigma - 6 \sqrt{2}\, \sigma,\ \sigma - 2 \sqrt{2}\, \sigma,\ 2 \sigma - 2 \sqrt{2}\, \sigma, 3 \sigma - 2 \sqrt{2}\, \sigma,\ 4 \sigma - 2 \sqrt{2}\, \sigma, \sigma + 2 \sqrt{2}\, \sigma, 2 \sigma + 2 \sqrt{2}\, \sigma, 3 \sigma + 2 \sqrt{2}\, \sigma, 4 \sigma + 2 \sqrt{2}\, \sigma, \sigma + 6 \sqrt{2}\, \sigma,\ 2 \sigma + 6 \sqrt{2}\, \sigma, 3 \sigma + 6 \sqrt{2}\, \sigma, 4 \sigma + 6 \sqrt{2}\, \sigma, \sigma + 10 \sqrt{2}\, \sigma, 2 \sigma + 10 \sqrt{2}\, \sigma,\ \ldots$$

$$\sigma = t \left(1 + \frac{89607\, e^4}{953312} + \frac{75}{32} C[1]^2 C[2]^2 - \frac{9 \left(C[1]^2 + C[2]^2\right)}{8 \sqrt{2}} + \frac{75}{64} \left(C[1]^4 + C[2]^4\right) + e^2 \left(\frac{21}{124} - \frac{4167 \left(C[1]^2 + C[2]^2\right)}{15376 \sqrt{2}} \right) \right) + \left(\frac{417688347\, e^5}{2633881892} + e^3 \left(\frac{2538}{29791} - \frac{26271 \left(C[1]^2 + C[2]^2\right)}{119164 \sqrt{2}} \right) + e \left(\frac{48}{31} + \frac{225}{62} C[1]^2 C[2]^2 - \frac{27}{31} \sqrt{2} \left(C[1]^2 + C[2]^2\right) + \frac{225}{124} \left(C[1]^4 + C[2]^4\right) \right) \right) \operatorname{Sin}[t] + \left(- \frac{13377241\, e^4}{84963932} + e^2 \left(\frac{855}{961} - \frac{7695 \left(C[1]^2 + C[2]^2\right)}{7688 \sqrt{2}} \right) \right) \operatorname{Sin}[2\, t] + \left(- \frac{37775255721\, e^5}{121158567032} + e^3 \left(\frac{1503718}{2055579} - \frac{2255577 \left(C[1]^2 + C[2]^2\right)}{2740772 \sqrt{2}} \right) \right) \operatorname{Sin}[3\, t] + \frac{474025501\, e^4 \operatorname{Sin}[4\, t]}{679711456} + \frac{18990343371\, e^5 \operatorname{Sin}[5\, t]}{26338818920}$$