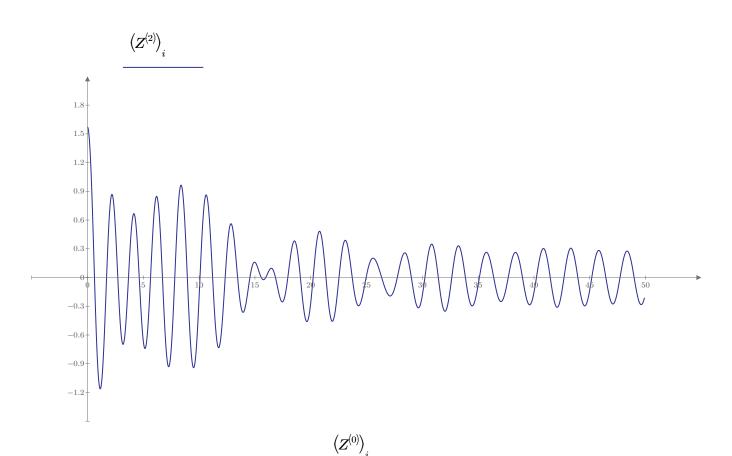
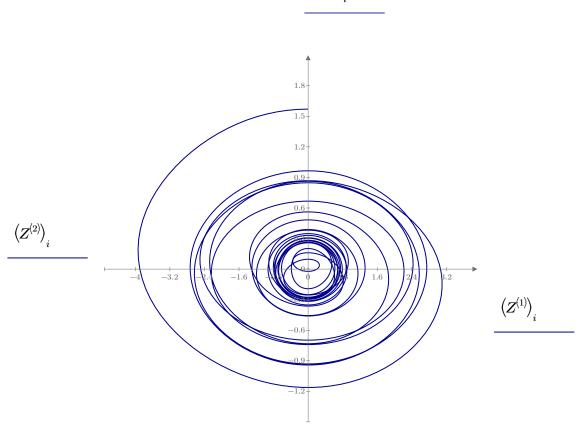
$$\begin{aligned} m &\coloneqq 1 \\ l &\coloneqq 1 & v_0 &\coloneqq 2 \cdot \sqrt{g \cdot l} & \varphi_0 &\coloneqq \frac{\pi}{2} & a &\coloneqq l & k &\coloneqq 0.5 \end{aligned} \qquad \underbrace{v_0} &\coloneqq 0 & y &\coloneqq \begin{bmatrix} v_0 \\ \varphi_0 \end{bmatrix} \qquad w_0 &\coloneqq \sqrt{\frac{g}{l}}$$

$$D\!\left(t\,,y\right)\!\coloneqq\!\begin{bmatrix} -w_0^{\,2}\,\boldsymbol{\cdot}\,y_{_1}\!\boldsymbol{\cdot}\,0\,-\,1\,\boldsymbol{\cdot}\,w_0^{\,2}\,\boldsymbol{\cdot}\sin\left(y_{_1}\right)\!-\!k\,\boldsymbol{\cdot}\,y_{_0}\!+\!a\,\boldsymbol{\cdot}\sin\left(w_1\!\boldsymbol{\cdot}\,t\right)\\ y_{_0} \end{bmatrix} \qquad Z\!\coloneqq\!\operatorname{rkfixed}\left(y\,,0\,,49.9\,,2000\,,D\right) \qquad Z\!=\!2000\,,$$





$$A \coloneqq \frac{1}{\sqrt{\left({w_0}^2 - w^2\right)^2 + 4\,\left(\delta^2 \cdot w^2\right)}} = \begin{bmatrix} 0.102 \\ 0.102 \\ \vdots \end{bmatrix} \qquad \qquad \varphi \coloneqq \operatorname{atan}\left(\frac{2 \cdot \delta \cdot w}{{w_0}^2 - w^2}\right) = \begin{bmatrix} 0 \\ 4.885 \cdot 10^{-4} \\ \vdots \end{bmatrix}$$

$$v_0 = 2 \cdot \sqrt{g \cdot l}$$
 $\varphi_0 = 0$ $a = l$

$$\varphi_0 := 0 \quad \underline{a} := l \quad \underline{k} := 0.2 \quad \underline{v}_0 := \frac{\pi}{2}$$

=1

$$v_0 = \frac{\pi}{2}$$

$$y = \begin{bmatrix} v_0 \\ \varphi_0 \end{bmatrix}$$

$$w_0 \coloneqq \sqrt{}$$

$$w0 \leftarrow \sqrt{\frac{g}{l}}$$

$$h \leftarrow 0.025$$

$$d \leftarrow 0.1$$

$$w \leftarrow w0 \cdot 0.1$$

$$v \leftarrow \frac{\pi}{24}$$

$$phi \leftarrow 0$$

$$i \leftarrow 0$$

$$m \leftarrow l \cdot \sin(phi)$$
while $i < n$

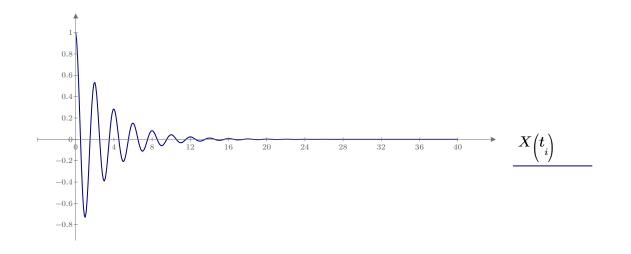
$$\begin{vmatrix} t \leftarrow h \cdot (a \cdot \sin(w \cdot i \cdot h) - w0^2 \cdot \sin(phi)) \\ phi \leftarrow phi + h \cdot v \\ v \leftarrow v + t \\ i \leftarrow i + 1 \\ \text{if } (l \cdot \sin(phi) > m) \\ \parallel m \leftarrow l \cdot \sin(phi) \end{vmatrix}$$

$$R\left(t\,,y\right)\coloneqq\begin{bmatrix} \frac{-g}{l}\!\cdot\!y_{_{1}}\!\cdot\!0-1\!\cdot\!w_{_{0}}\!\cdot\!\sin\!\left(y_{_{1}}\right)\!-\!k\!\cdot\!y_{_{0}}\!+\!a\!\cdot\!\sin\!\left(w_{_{1}}\right)\!-\!y_{_{0}}\!+\!a\!\cdot\!\sin\!\left(w_{_{1}}\right)\!-\!y_{_{0}}\!+\!a\!\cdot\!\sin\!\left(w_{_{1}}\right)\!-\!y_{_{0}}\!+\!y_{_{0$$

$$\oint := 0, 0.1..40 = \begin{bmatrix} 0 \\ \vdots \end{bmatrix}$$

$$d \coloneqq 0.1$$
 $w0 \coloneqq \sqrt{\frac{g}{l}}$ $w \coloneqq w0$ $f \coloneqq 0$
$$A0 \coloneqq l \qquad b \coloneqq d \cdot w0 \qquad X(t) \coloneqq A0 \cdot e^{-b \cdot t} \cdot \cos(w \cdot t + f)$$





$$n = 1000$$

$$m = 3$$
 $step = \frac{m}{n} = 0.003$
 $k = 0, step ... m = \begin{bmatrix} 0 \\ 0.003 \\ 0.006 \\ \vdots \end{bmatrix}$

$$k = 0, step..m = \begin{bmatrix} 0 \\ 0.003 \\ 0.006 \\ \vdots \end{bmatrix}$$

$$z(t) = 3 \cdot \frac{t}{m}$$

$$z(k) = \begin{bmatrix} 0 \\ 0.003 \\ 0.006 \\ \vdots \end{bmatrix}$$

$$A_{1} \coloneqq \left\| \begin{matrix} j \leftarrow 0 \\ \text{while } j \leq 320 \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w1_{j}^{2} \right)^{2} + 4 \ b1_{0}^{2} \cdot w1_{j}^{2}}} \right\| A_{2} \coloneqq \left\| \begin{matrix} j \leftarrow 0 \\ \text{while } j \leq n \end{matrix} \right\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w2_{j}^{2} \right)^{2} + 4 \ b2_{0}^{2} \cdot w2_{j}^{2}}} \right\| j \leftarrow j + 1$$

$$A_{5} \coloneqq \begin{vmatrix} j \leftarrow 0 \\ \text{while } j \leq n \\ \left\| (A)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{2}\right)^{2} + 4 b_{15}^{2} \cdot w_{j}^{2}}} \right\|} \\ | j \leftarrow j + 1 \end{vmatrix}$$

$$A_9 \coloneqq \left\| egin{aligned} j \leftarrow 0 \ ext{while } j \leq n \end{aligned}
ight. \left\| \left(A
ight)_j \leftarrow rac{A0}{m \cdot \sqrt{\left(w0^2 - w_j^{\ 2}
ight)^2 + 4 \, b_{50}^{\ 2} \cdot w_j^{\ 2}}}
ight.$$

$$\left\| A \right\|_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{2}\right)^{2} + 4 b_{20}^{2} \cdot w_{j}^{2}}}$$

$$| j \leftarrow j + 1$$

$$A_{10} \coloneqq \left\| j \leftarrow 0 \right|$$

$$k1 = 0, s$$

$$w1 \coloneqq$$

$$d1 =$$

$$\begin{bmatrix} 0 \\ \vdots \end{bmatrix}$$

$$\begin{vmatrix} j \leftarrow 0 \\ \text{while } j \leq n \\ \| (A)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w2_{j}^{2}\right)^{2} + 4b2_{0}^{2} \cdot w2_{j}^{2}}} \\ | j \leftarrow j + 1 \end{vmatrix}$$

$$A_{5} \coloneqq \left\| \begin{array}{l} j \leftarrow 0 \\ \text{while } j \leq n \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{15}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} j \leftarrow 0 \\ \text{while } j \leq n \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} j \leftarrow 0 \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} j \leftarrow 0 \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} j \leftarrow 0 \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \begin{array}{l} A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{6} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A_{6} \times \left(a \right)}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{\ 2} \right)^{2} + 4 \ b_{20}^{\ 2} \cdot w_{j}^{\ 2}}} \right\| \\ A_{7} \coloneqq \left$$

$$A_{9} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \text{while } j \leq n \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{2} \right)^{2} + 4 \ b_{50}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \text{while } j \leq n \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \begin{array}{c} j \leftarrow 0 \\ \\ \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| \left(A \right)_{j} \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| A_{10} = \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| A_{10} = \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| A_{10} = \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| A_{10} = \frac{A0}{m \cdot \sqrt{\left(w0^{2} - w_{j}^{-2} \right)^{2} + 4 \ b_{100}^{-2} \cdot w_{j}^{-2}}} \right\| \\ A_{10} \coloneqq \left\| A_$$

