

$m := 1$
 $l := 1$

$v_0 := 2 \cdot \sqrt{g \cdot l}$

$\varphi_0 := \frac{\pi}{2}$

$a := l$

$g := 9.80665$
 $k := 0.5$

$v_0 := 0$

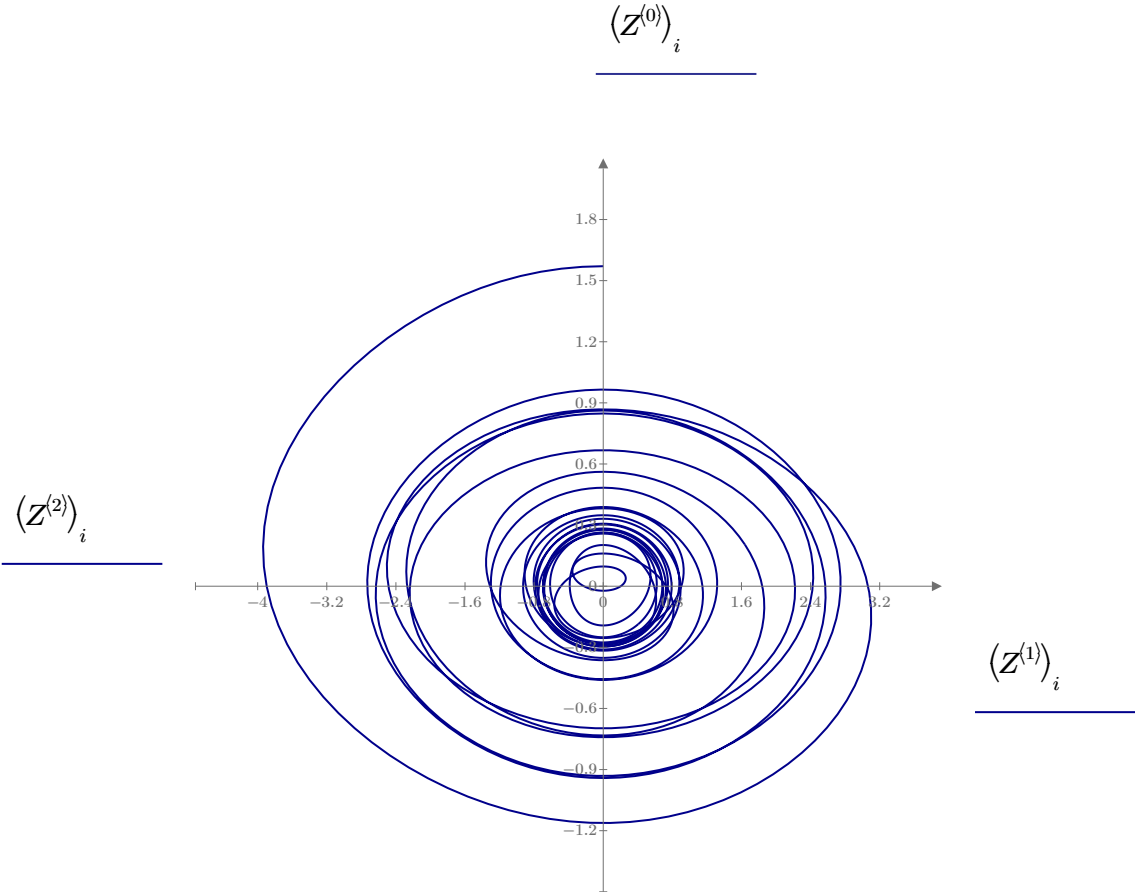
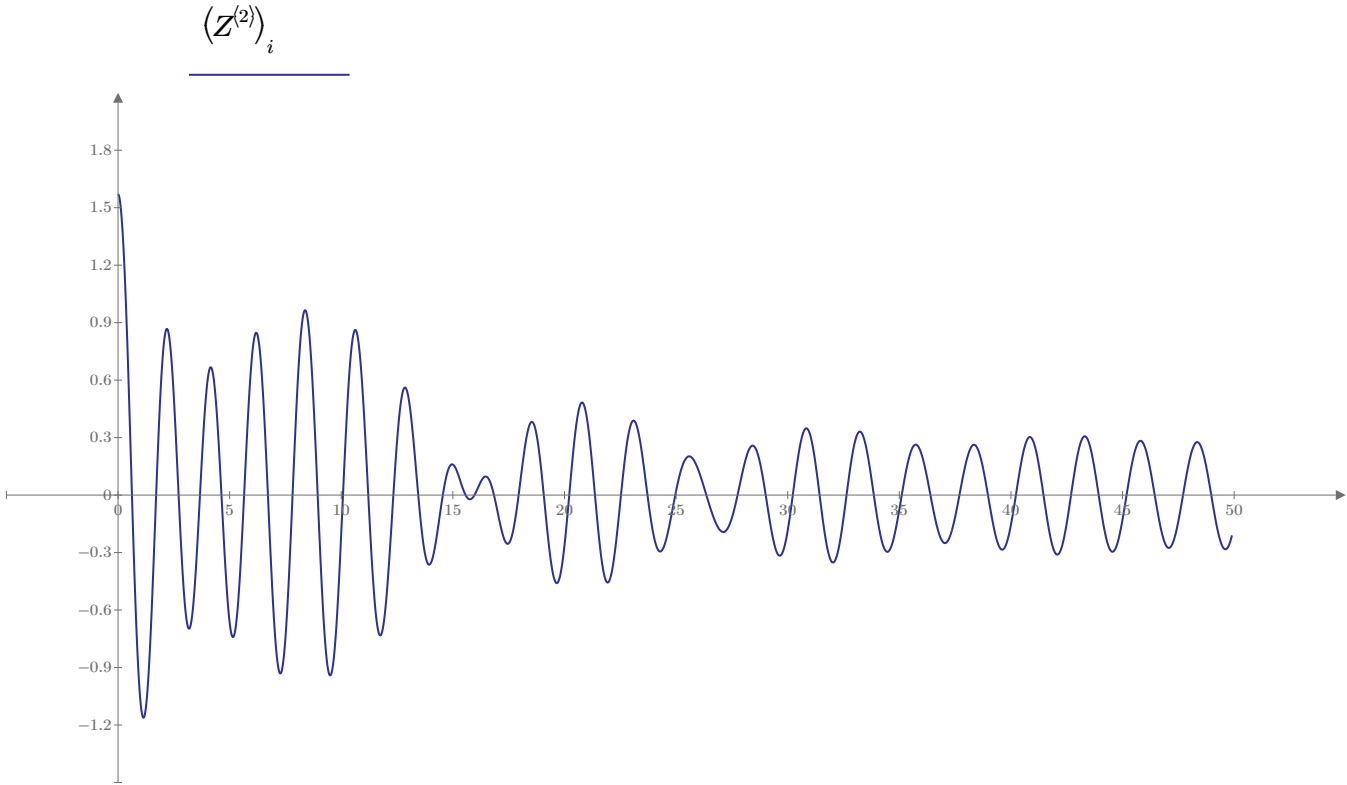
$y := \begin{bmatrix} v_0 \\ \varphi_0 \end{bmatrix}$

$w_0 := \sqrt{\frac{g}{l}}$

$D(t,y) := \begin{bmatrix} -w_0^2 \cdot y_1 \cdot 0 - 1 \cdot w_0^2 \cdot \sin(y_1) - k \cdot y_0 + a \cdot \sin(w_1 \cdot t) \\ y_0 \end{bmatrix}$

$Z := \text{rkfixed}(y,0,49.9,2000,D)$

$Z =$



$$A:=\frac{1}{\sqrt{\left(w_0^2-w^2\right)^2+4\left(\delta^2\cdot w^2\right)}}=\begin{bmatrix}0.102\\0.102\\\vdots\end{bmatrix}$$

$$\varphi:=\text{atan}\left(\frac{2\cdot\delta\cdot w}{w_0^2-w^2}\right)=\begin{bmatrix}0\\4.885\cdot10^{-4}\\\vdots\end{bmatrix}$$

$$\boxed{v_0}:=2\cdot\sqrt{g\cdot l}\qquad \boxed{\varphi_0}:=0\quad \boxed{a}:=l\quad \boxed{g}:=9.80665\qquad \boxed{k}:=0.2\qquad \boxed{v_0}:=\frac{\pi}{2}\qquad \boxed{y}:=\begin{bmatrix}v_0\\\varphi_0\end{bmatrix}\qquad \boxed{w_0}:=\sqrt{\frac{g}{l}}$$

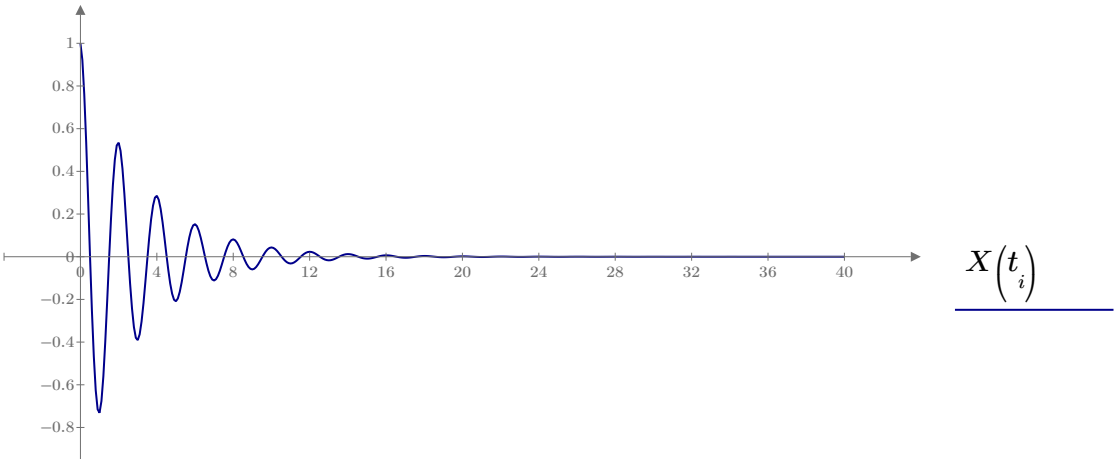
$$\begin{array}{l}w0\leftarrow\sqrt{\frac{g}{l}}\\h\leftarrow0.025\\d\leftarrow0.1\\w\leftarrow w0\cdot0.1\\v\leftarrow\frac{\pi}{24}\\phi i\leftarrow0\\i\leftarrow0\\m\leftarrow l\cdot\sin(\phi i)\\\text{while }i<n\\ \quad\left\|\begin{array}{l}t\leftarrow h\cdot\left(a\cdot\sin(w\cdot i\cdot h)-w0^2\cdot\sin(\phi i)\right)\\\phi i\leftarrow\phi i+h\cdot v\\v\leftarrow v+t\\i\leftarrow i+1\\\text{if }\left(l\cdot\sin(\phi i)>m\right)\\ \quad\left\|\begin{array}{l}m\leftarrow l\cdot\sin(\phi i)\end{array}\right\|\end{array}\right\|\\m\end{array}=1$$

$$R(t,y):=\begin{bmatrix}\frac{-g}{l}\cdot y_1\cdot 0-1\cdot w_0\cdot\sin\left(y_1\right)-k\cdot y_0+a\cdot\sin\left(w\cdot t\right)\\y_0\end{bmatrix}$$

$$\boxed{A^{(i)}}_j:=\frac{A0}{m\cdot\sqrt{\left(w0^2-w_j^2\right)^2+4\,b_i^2\cdot w_j^2}}$$

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

$$\begin{array}{llll}d:=0.1&&w0:=\sqrt{\frac{g}{l}}&&\boxed{w}:=w0&&\boxed{f}:=0&&\boxed{m}:=1\\&&&&&&&&\boxed{l}:=1\\A0:=l&&b:=d\cdot w0&&X(t):=A0\cdot e^{-b\cdot t}\cdot\cos(w\cdot t+f)\end{array}$$



$$\underline{t_i}$$

$$\overline{n}:=1000$$

$$\overline{m}:=3 \qquad step:=\frac{m}{n}=0.003$$

$$k1:=0,s$$

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

$$z(t):=3\cdot\frac{t}{m} \qquad z(k)=\begin{bmatrix} 0 \\ 0.003 \\ 0.006 \\ \vdots \end{bmatrix}$$

$$w1:=$$

$$d1:=$$

$$\overline{w}:=w0\cdot k=\begin{bmatrix} 0 \\ 0.009 \\ 0.019 \\ \vdots \end{bmatrix}$$

$$b1$$

$$\overline{d}:=0,0.01..10=\begin{bmatrix} 0 \\ \vdots \end{bmatrix}$$

$$\overline{b}:=w0\cdot d$$

$$A_1:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq 320 \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w1_j^2\right)^2+4\;b1_0^2\cdot w1_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$A_2:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq n \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w2_j^2\right)^2+4\;b2_0^2\cdot w2_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$A_5:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq n \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w_j^2\right)^2+4\;b_{15}^2\cdot w_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$A_6:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq n \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w_j^2\right)^2+4\;b_{20}^2\cdot w_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$A_9:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq n \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w_j^2\right)^2+4\;b_{50}^2\cdot w_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$A_{10}:=\left\|\begin{array}{l} j\leftarrow 0 \\ \text{while } j\leq n \\ \left\|\begin{array}{l} (A)_j\leftarrow\frac{A0}{m\cdot\sqrt{\left(w0^2-w_j^2\right)^2+4\;b_{100}^2\cdot w_j^2}} \\ j\leftarrow j+1 \end{array}\right\| \\ A \end{array}\right\|$$

$$\left\| \frac{J - J^T}{A} \right\|$$

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$$\frac{w1_i}{w0}$$

$$\frac{w2_i}{w0}$$

$$\frac{w_i}{w0}$$

$$A_{1_i}$$

$$A_{2_i}$$

$$A_{3_i}$$

$$A_{4_i}$$

$$A_{5_i}$$

$$A_{6_i}$$

$$A_{7_i}$$

$$A_{8_i}$$

$$A_{9_i}$$

$$A_{10_i}$$

$$A_{11_i}$$

$$A_{12_i}$$

