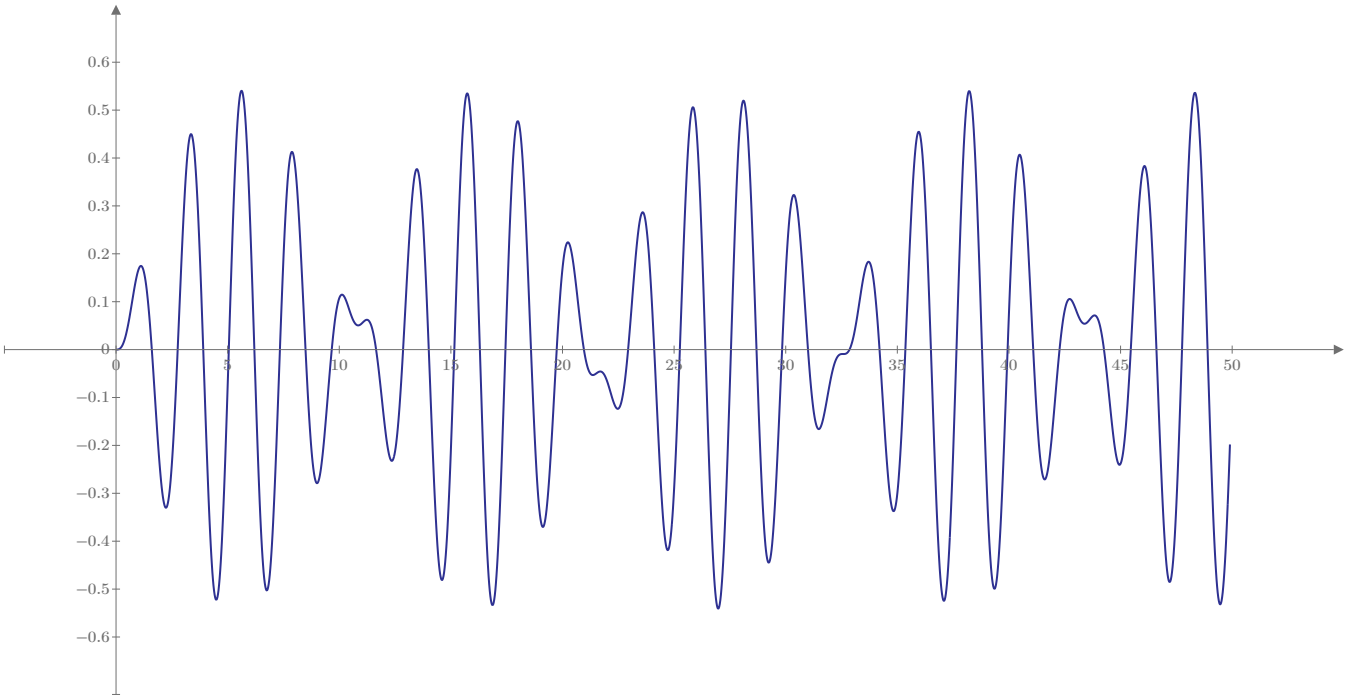
$m := 1$ $g := 9.80665$

$l := 1$ $v_0 := 2 \cdot \sqrt{g \cdot l}$ $\varphi_0 := 0$ $a := l$ $k := 0.5$ $v_0 := 0$ $y := \begin{bmatrix} v_0 \\ \varphi_0 \end{bmatrix}$ $w_0 := \sqrt{\frac{g}{l}}$

$$D(t, y) := \begin{bmatrix} -w_0^{\,2} \cdot y_1 \cdot 0 - 1 \cdot w_0^{\,2} \cdot \sin\left(y_1\right) - k \cdot y_0 + a \cdot \sin\left(w_1 \cdot t\right) \\ y_0 \end{bmatrix} \qquad Z := \text{rkfixed}\left(y, 0, 49.9, 2000, D\right) \qquad Z =$$

$\left(Z^{\langle 2 \rangle}\right)_i$

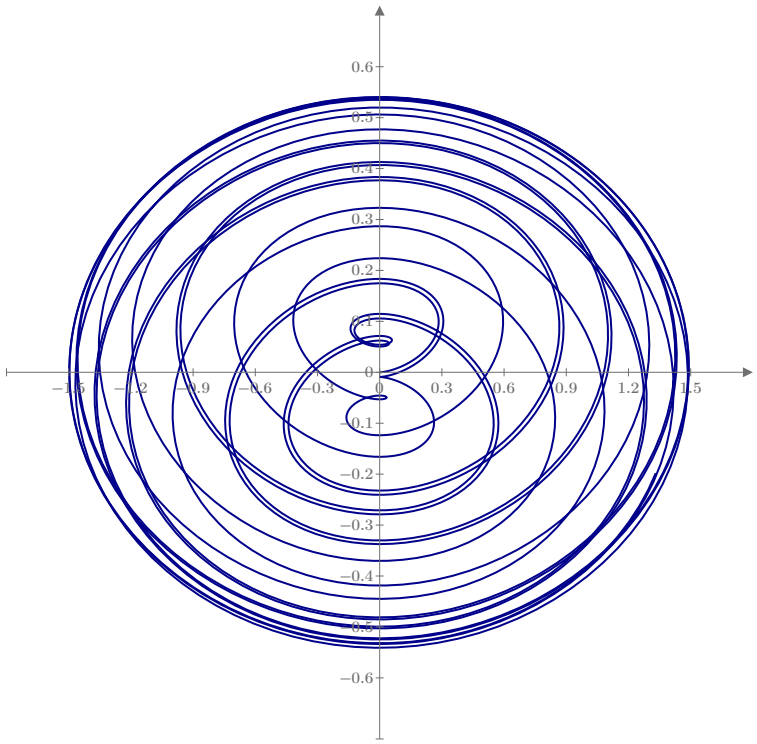


$\left(Z^{\langle 0 \rangle}\right)_i$

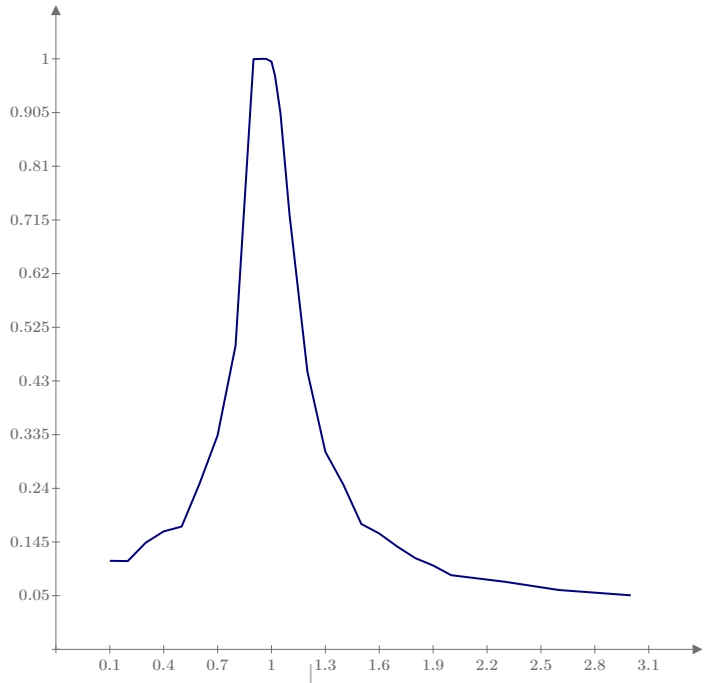
$amax :=$

$Q := \text{rkfixed}\left(y, 0, 10, 20,\right.$

$\left(Z^{\langle 2 \rangle}\right)_i$



$\left(Z^{\langle 1 \rangle}\right)_i$



A

wr

$w0 \leftarrow \sqrt{\frac{g}{l}}$ $= 0.052$

$h \leftarrow 0.025$

$d \leftarrow 0.1$

$w \leftarrow w0 \cdot 0.1$

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

$phi \leftarrow 0$

$i \leftarrow 0$

$m \leftarrow l \cdot \sin(phi)$

while $i < n$

$\quad t \leftarrow h \cdot (a \cdot \sin(w \cdot i \cdot h) - w0^2 \cdot \sin(phi))$

$\quad phi \leftarrow phi + h \cdot v$

$\quad v \leftarrow v + t$

$\quad i \leftarrow i + 1$

$\quad$ if $(l \cdot \sin(phi) > m)$

$\quad\quad m \leftarrow l \cdot \sin(phi)$

m

$\frac{w}{\sqrt{w_0}} 0.5$ $\quad n := 2000$

$h := 0.025$ $\quad m := 20$

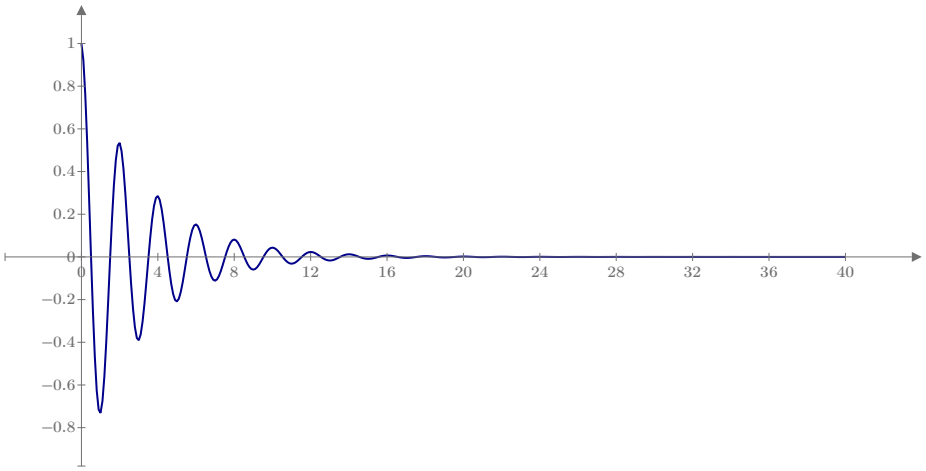
$$R(t,y) := \begin{bmatrix} \frac{-g}{l} \cdot y_1 \cdot 0 - 1 \cdot w_0 \cdot \sin(y_1) - k \cdot y_0 + a \cdot \sin(w_0 \cdot t) \\ y_0 \end{bmatrix}$$

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

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

$d := 0.1$ $\quad w0 := \sqrt{\frac{g}{l}}$ $\quad w := w0$ $\quad f := 0$ $\quad m := 1$ $\quad l := 1$

$A0 := l$ $\quad b := d \cdot w0$ $\quad X(t) := A0 \cdot e^{-b \cdot t} \cdot \cos(w \cdot t + f)$



$X(t_i)$

t_i

$n := 1000$

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

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

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

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

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

$b := w0 \cdot d$

$k1 := 0, s$

$w1 :=$

$d1 :=$

$b1$

$A_1 :=$ for $j \leftarrow 0$; while $j \le 320$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w1_j^{\,2}\right)^2 + 4\ b1_0^{\,2} \cdot w1_j^{\,2}}}$; $j \leftarrow j + 1$; A

$A_2 :=$ for $j \leftarrow 0$; while $j \le n$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w2_j^{\,2}\right)^2 + 4\ b2_0^{\,2} \cdot w2_j^{\,2}}}$; $j \leftarrow j + 1$; A

$A_5 :=$ for $j \leftarrow 0$; while $j \le n$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w_j^{\,2}\right)^2 + 4\ b_{15}^{\,2} \cdot w_j^{\,2}}}$; $j \leftarrow j + 1$; A

$A_6 :=$ for $j \leftarrow 0$; while $j \le n$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w_j^{\,2}\right)^2 + 4\ b_{20}^{\,2} \cdot w_j^{\,2}}}$; $j \leftarrow j + 1$; A

$A_9 :=$ for $j \leftarrow 0$; while $j \le n$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w_j^{\,2}\right)^2 + 4\ b_{50}^{\,2} \cdot w_j^{\,2}}}$; $j \leftarrow j + 1$

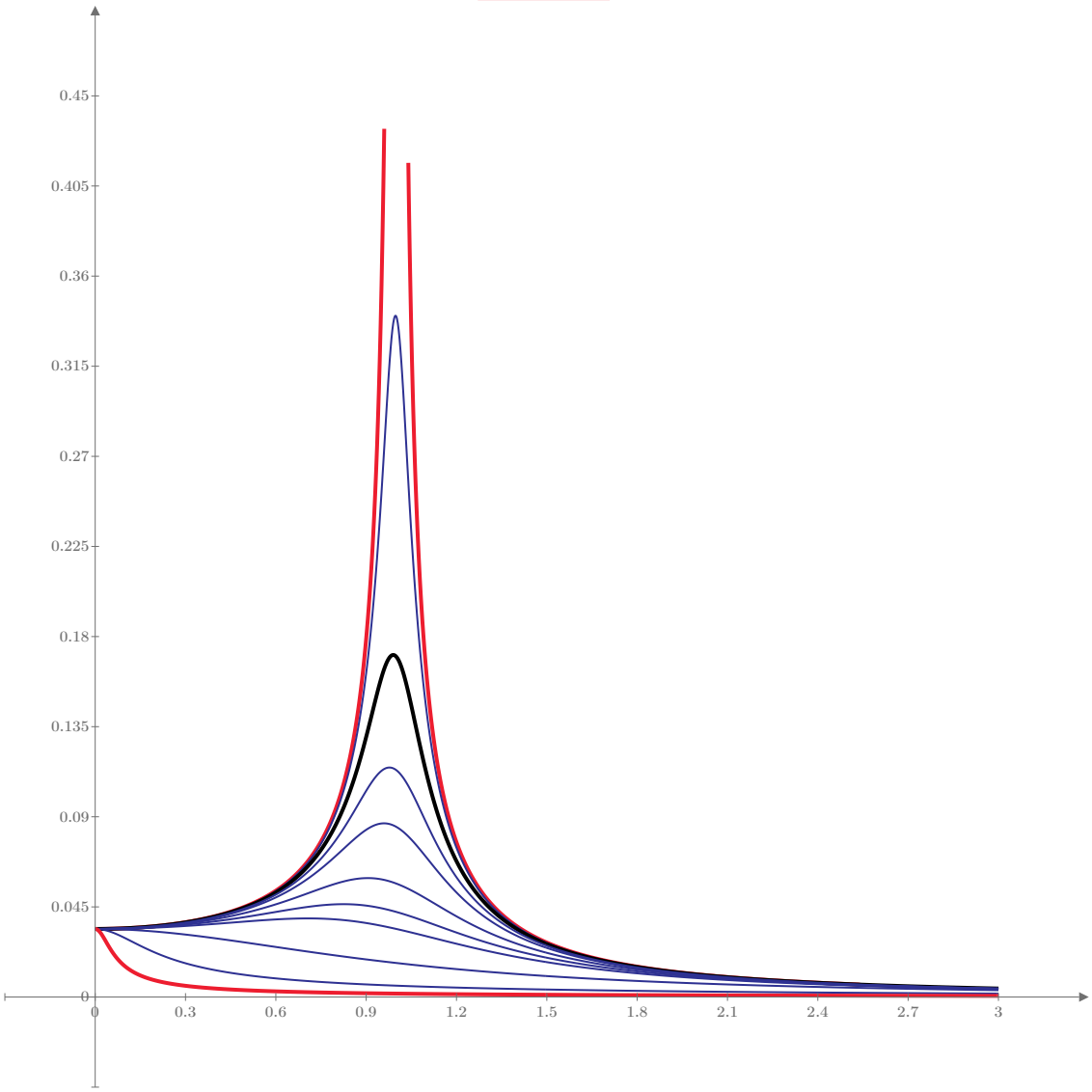
$A_{10} :=$ for $j \leftarrow 0$; while $j \le n$: $(A)_j \leftarrow \frac{A0}{m \cdot \sqrt{\left(w0^2 - w_j^{\,2}\right)^2 + 4\ b_{100}^{\,2} \cdot w_j^{\,2}}}$; $j \leftarrow j + 1$

$\|A$ $\|A$

$\frac{w1_i}{w0}$

$\frac{w2_i}{w0}$

$\frac{w_i}{w0}$



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}