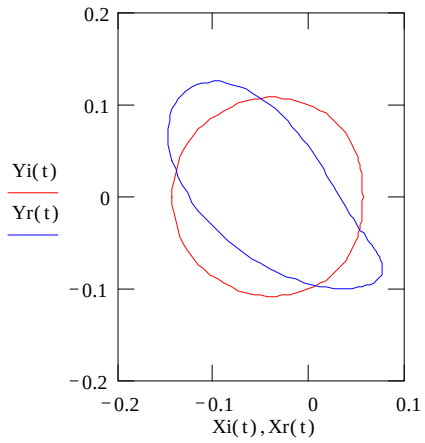
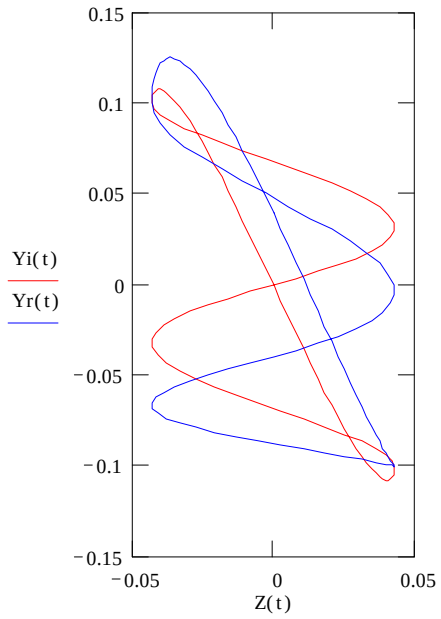
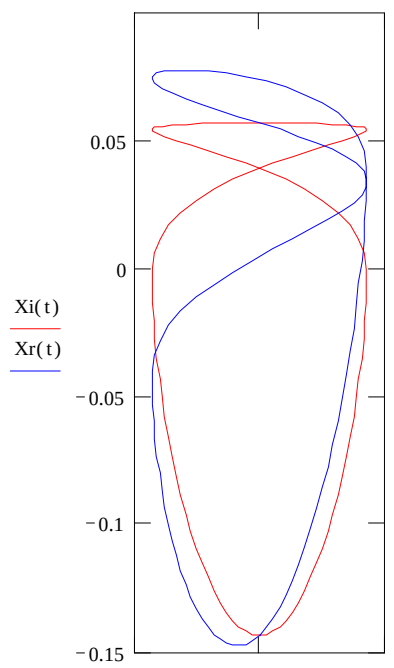
$F := -1$ $R := -0.1$ $r := -0.043$ $h := 0.04$ $\Omega := 2\cdot\pi$ $\omega := -\Omega$ $t := 0, 0.01 .. 1$ Alles SI-Einheiten $q(t) := \text{if}(\cos(\Omega\cdot t) > 0, 1, -1)$

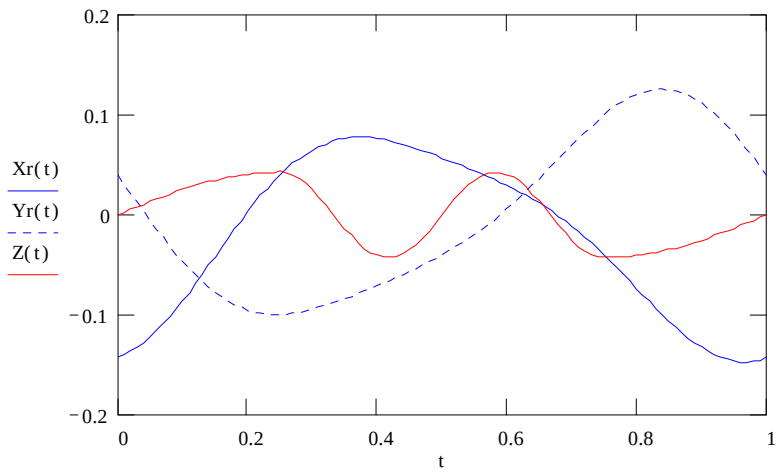
$Xi(t) := (R + r\cdot\cos(\omega\cdot t))\cdot\cos(\Omega\cdot t)$ $Yi(t) := (R + r\cdot\cos(\omega\cdot t))\cdot\sin(\Omega\cdot t)$ $Z(t) := r\cdot\sin(2\cdot\omega\cdot q(t)\cdot t - \omega\cdot t)$

$Xr(t) := (R + r\cdot\cos(\omega\cdot t))\cdot\cos(\Omega\cdot t) + h\cdot\sin(\Omega\cdot t)$ $Yr(t) := (R + r\cdot\cos(\omega\cdot t))\cdot\sin(\Omega\cdot t) + h\cdot\cos(\Omega\cdot t)$



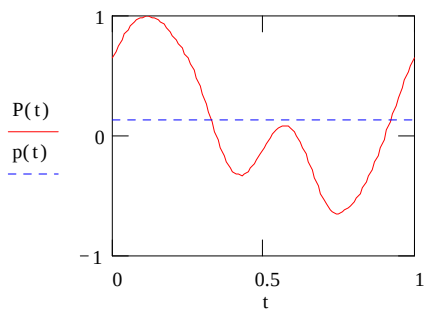

$P(t) := F\cdot((Xr(t) + Yr(t))\cdot\Omega + Z(t)\cdot\omega)$ $p(t) := \int_0^1 P(t)\,dt$

$p(0) = 0.135$

$Xr(0) = -0.143$

$Yr(0) = 0.04$

$Z(0) = 0$




$Pxr(t) := F\cdot Xr(t)\cdot\Omega$ $P(t) := F\cdot\int_0^1 (Xr(t)\cdot\Omega)\,dt$ $P(1) = 0.13509$ Watt pro Arm

$\frac{P(1)}{10^3} = 1.351\cdot10^{-4}$

$Pz(t) := F\cdot Z(t)\cdot\omega$ $Pz(0.25) = 0.27$

$Mx(t) := F\cdot Xr(t)$

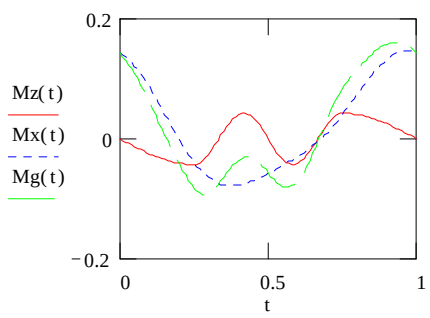
$Mz(t) := F\cdot Z(t)$

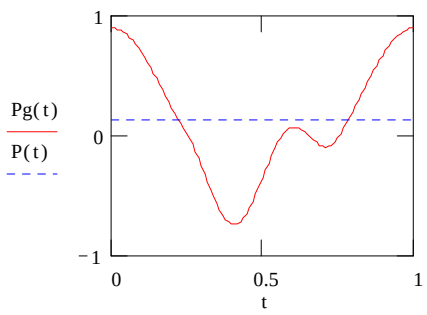
$Mg(t) := Mx(t) + Mz(t)$

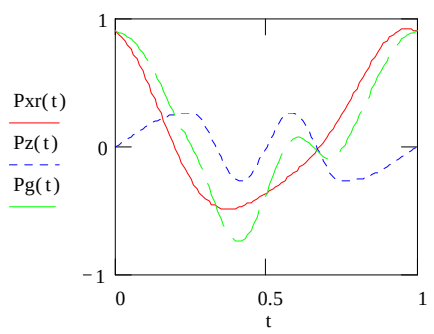
$Pg(t) := Mx(t)\cdot\Omega + Mz(t)\cdot\omega$

$Pg(0) = 0.898$

$Pzg(t) := F\cdot\int_0^1 Z(t)\,dt\cdot\omega$ $Pzg(1) = 0$



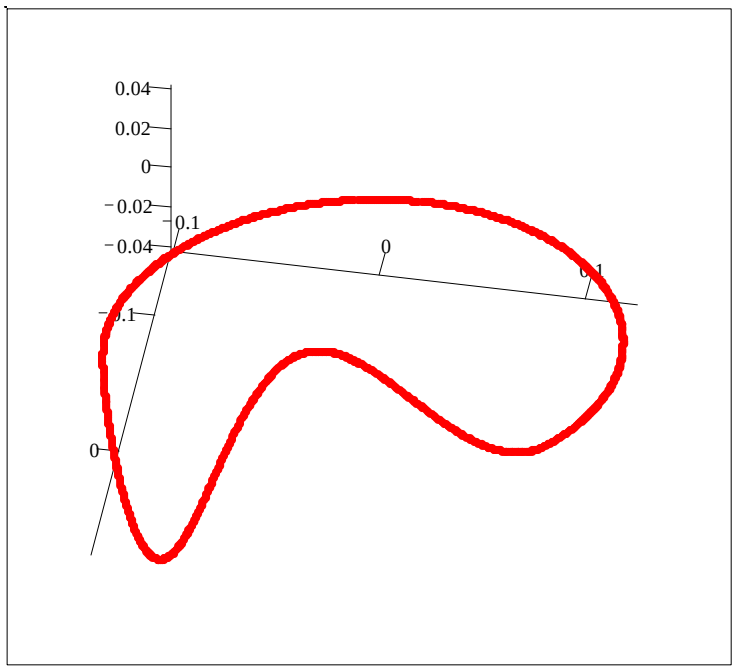



$n := 1000 \qquad i := 0 .. n - 1 \qquad \omega := -\Omega$

$$X_i := \left(R + r\cdot\cos\left(\omega\cdot\frac{i}{n}\right)\right)\cdot\cos\left(\Omega\cdot\frac{i}{n}\right) + h\cdot\sin\left(\Omega\cdot\frac{i}{n}\right)$$

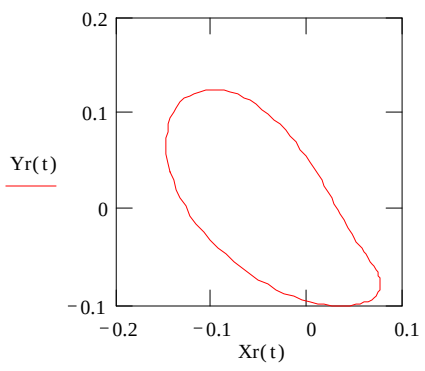
$$Y_i := \left(R + r\cdot\cos\left(\omega\cdot\frac{i}{n}\right)\right)\cdot\sin\left(\Omega\cdot\frac{i}{n}\right) + h\cdot\cos\left(\Omega\cdot\frac{i}{n}\right)$$

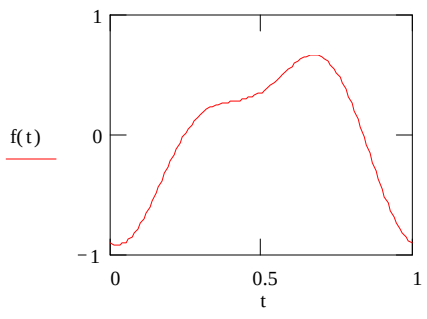
$$q_i := \text{if}\left(\cos\left(\Omega\cdot\frac{i}{n}\right) > 0, 1, -1\right) \qquad Z_i := r\cdot\sin\left(2\cdot\omega\cdot q_i\cdot\frac{i}{n} - \omega\cdot\frac{i}{n}\right)$$

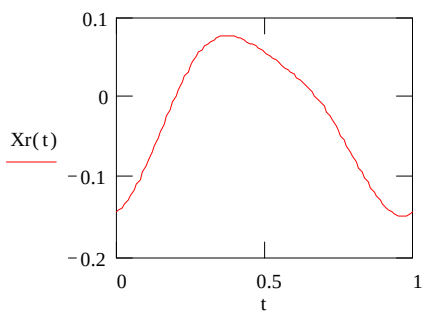



X, Y, Z

$$f(t) := \frac{d}{dt}Yr(t)$$




$T1 := $
$n \leftarrow 0$
$t \leftarrow 0.3$
while $n < 6$
  $t \leftarrow t - \dfrac{\frac{d}{dt}Yr(t)}{\frac{d^2}{dt^2}Yr(t)}$
  $n \leftarrow n + 1$
$t \leftarrow t$

$T2 := $
$n \leftarrow 0$
$t \leftarrow 0.8$
while $n < 6$
  $t \leftarrow t - \dfrac{\frac{d}{dt}Yr(t)}{\frac{d^2}{dt^2}Yr(t)}$
  $n \leftarrow n + 1$
$t \leftarrow t$

$T01 := $
$n \leftarrow 0$
$t \leftarrow 0.1$
while $n < 6$
  $t \leftarrow t - \dfrac{Xr(t)}{\frac{d}{dt}Xr(t)}$
  $n \leftarrow n + 1$
$t \leftarrow t$

$T02 := $
$n \leftarrow 0$
$t \leftarrow 0.7$
while $n < 6$
  $t \leftarrow t - \dfrac{Xr(t)}{\frac{d}{dt}Xr(t)}$
  $n \leftarrow n + 1$
$t \leftarrow t$

$T1 = 0.245 \qquad T2 = 0.839 \qquad T01 = 0.196 \qquad T02 = 0.677$

$Yr(T1) = -0.1 \qquad Yr(T2) = 0.125 \qquad L01 := \int_{T02}^{T2} Xr(t)\,dt \qquad Lpos := \int_{T1}^{T2} Xr(t)\,dt \qquad Lpos = 0.015$

$L01 = -7.531\cdot10^{-3} \qquad Lneg := \int_{T2}^{T1+1} Xr(t)\,dt \qquad Lneg = -0.037$

$Lges := Lpos + Lneg \qquad Lges = -0.022$

$Pges := F\cdot Lges\cdot\Omega \qquad Pges = 0.135$