

Diagramme de phase de l'oscillateur amorti par frottement fluide laminaire

restart

with(plots)

$$\begin{aligned} &[animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d, \\ &\quad conformal, conformal3d, contourplot, contourplot3d, coordplot, coordplot3d, densityplot, \\ &\quad display, fieldplot, fieldplot3d, gradplot, gradplot3d, graphplot3d, implicitplot, \\ &\quad implicitplot3d, inequal, interactive, interactiveparams, intersectplot, listcontplot, \\ &\quad listcontplot3d, listdensityplot, listplot, listplot3d, loglogplot, logplot, matrixplot, multiple, \\ &\quad odeplot, pareto, plotcompare, pointplot, pointplot3d, polarplot, polygonplot, \\ &\quad polygonplot3d, polyhedra_supported, polyhedraplot, rootlocus, semilogplot, setcolors, \\ &\quad setoptions, setoptions3d, spacecurve, sparsematrixplot, surfdata, textplot, textplot3d, \\ &\quad tubeplot] \end{aligned} \quad (1)$$

régime pseudo-périodique

$$\begin{aligned} x &:= X e^{-\alpha t} \left(\cos(\omega t) + \frac{\alpha \sin(\omega t)}{\omega} \right) \\ &\quad X e^{-\alpha t} \left(\cos(\omega t) + \frac{\alpha \sin(\omega t)}{\omega} \right) \end{aligned} \quad (2)$$

$$\begin{aligned} v &:= \frac{\partial}{\partial t} x \\ &\quad -X \alpha e^{-\alpha t} \left(\cos(\omega t) + \frac{\alpha \sin(\omega t)}{\omega} \right) + X e^{-\alpha t} (-\sin(\omega t) \omega + \alpha \cos(\omega t)) \end{aligned} \quad (3)$$

$$\begin{aligned} y &:= \frac{v}{w0} \\ &\quad \frac{-X \alpha e^{-\alpha t} \left(\cos(\omega t) + \frac{\alpha \sin(\omega t)}{\omega} \right) + X e^{-\alpha t} (-\sin(\omega t) \omega + \alpha \cos(\omega t))}{w0} \end{aligned} \quad (4)$$

$$\begin{aligned} \omega &:= \sqrt{w0^2 - \alpha^2} \\ &\quad \sqrt{w0^2 - \alpha^2} \end{aligned} \quad (5)$$

$$\begin{aligned} w0 &:= 2 \pi \\ &\quad 2 \pi \end{aligned} \quad (6)$$

$$\begin{aligned} \alpha &:= 0.7 \\ &\quad 0.7 \end{aligned} \quad (7)$$

$$\begin{aligned} X &:= 1 \\ &\quad 1 \end{aligned} \quad (8)$$

$$\begin{aligned} pl &:= plot([x, y, t=0..5], numpoints=500, color=red) \\ &\quad PLOT(...) \end{aligned} \quad (9)$$

remise en état des variables littérales

$\alpha := '\alpha'$

α

(10)

$w0 := 'w0'$

$w0$

(11)

$X := 'X'$

X

(12)

régime critique

$x := X e^{-\alpha t} (1 + \alpha t)$

$X e^{-\alpha t} (1 + \alpha t)$

(13)

$v := \frac{\partial}{\partial t} x$

$-X \alpha e^{-\alpha t} (1 + \alpha t) + X e^{-\alpha t} \alpha$

(14)

$y := \frac{v}{w0}$

$\frac{-X \alpha e^{-\alpha t} (1 + \alpha t) + X e^{-\alpha t} \alpha}{w0}$

(15)

$w0 := 2 \pi$

2π

(16)

$\alpha := 2 \pi$

2π

(17)

$X := 1$

1

(18)

$p2 := plot([x, y, t=0..5], linestyle=2, color=green)$

$PLOT(...)$

(19)

$display(\{p1, p2\}, scaling=constrained)$

