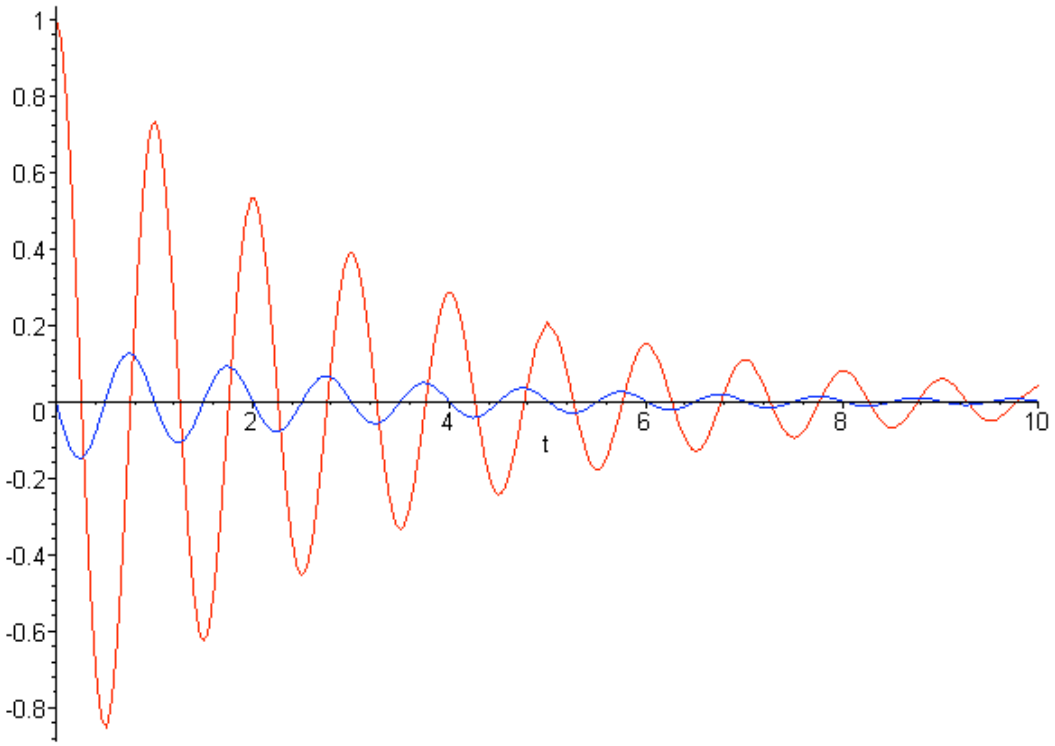
Equations différentielles : Régime transitoire et régime sinusoïdal forcé dans un circuit *RLC*

Voici une proposition de correction :

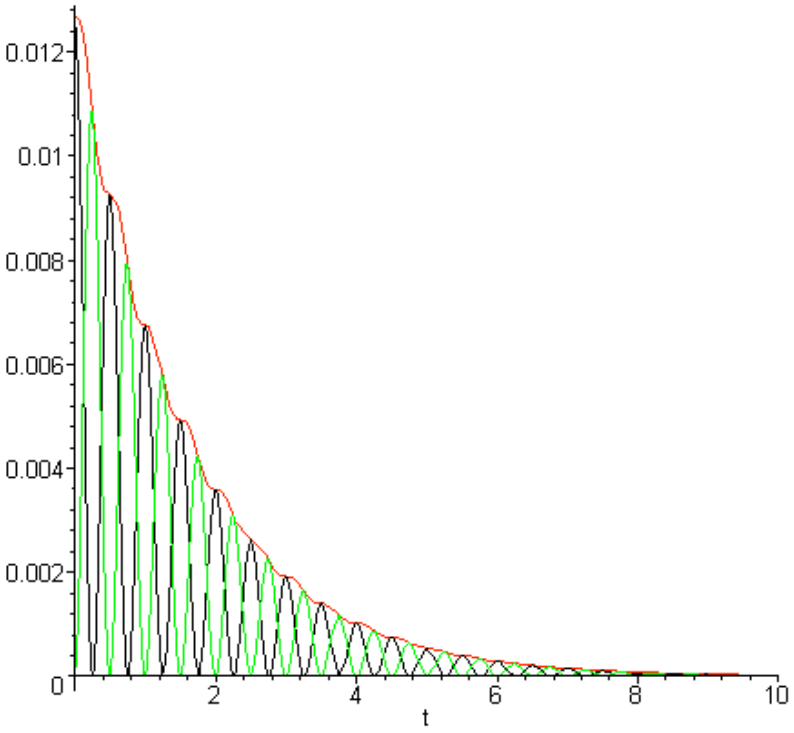
Equations différentielles: régimes transitoires dans RLC

Décharge de C dans RL

```
> restart;
>
eqs:=diff(u(t),t$2)+(omega0/Q)*diff(u(t),t)+(omega0)^2*u(t)=0:
> dsolve(eqs,u(t)):
> condinit:=u(0)=u0,D(u)(0)=0:
> dsolve({eqs,condinit},u(t)):
> assign(%):
> u(t):
> subs(Q=10,%):
> evalc(%):
> simplify(%):
> factor(%):
> u1:=subs(omega0=2*Pi,u0=1,%):
> i:=diff(u1,t)/(4*Pi*Pi):
> plot([i,u1],t=0..10,color=[blue,red]);
```

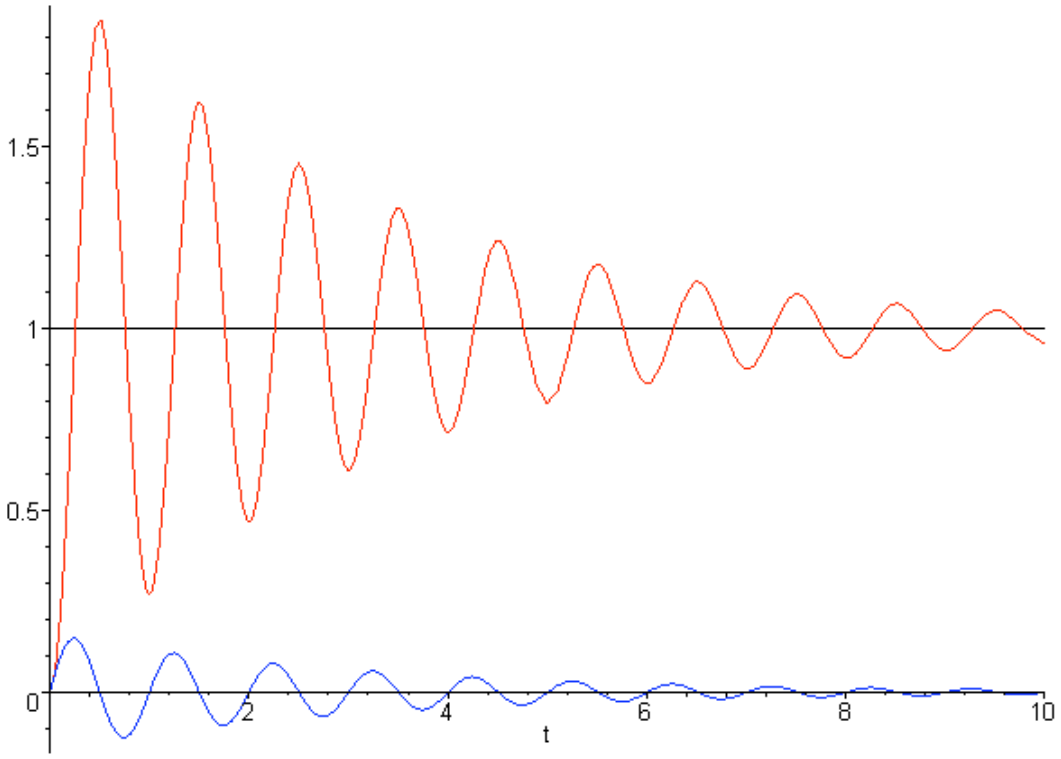



```
> EL:=i*i/2:EC:=u1*u1/(8*Pi*Pi):Etot:=EL+EC:
> plot([EL,EC,Etot],t=0..10,color=[green,black,red]);
```

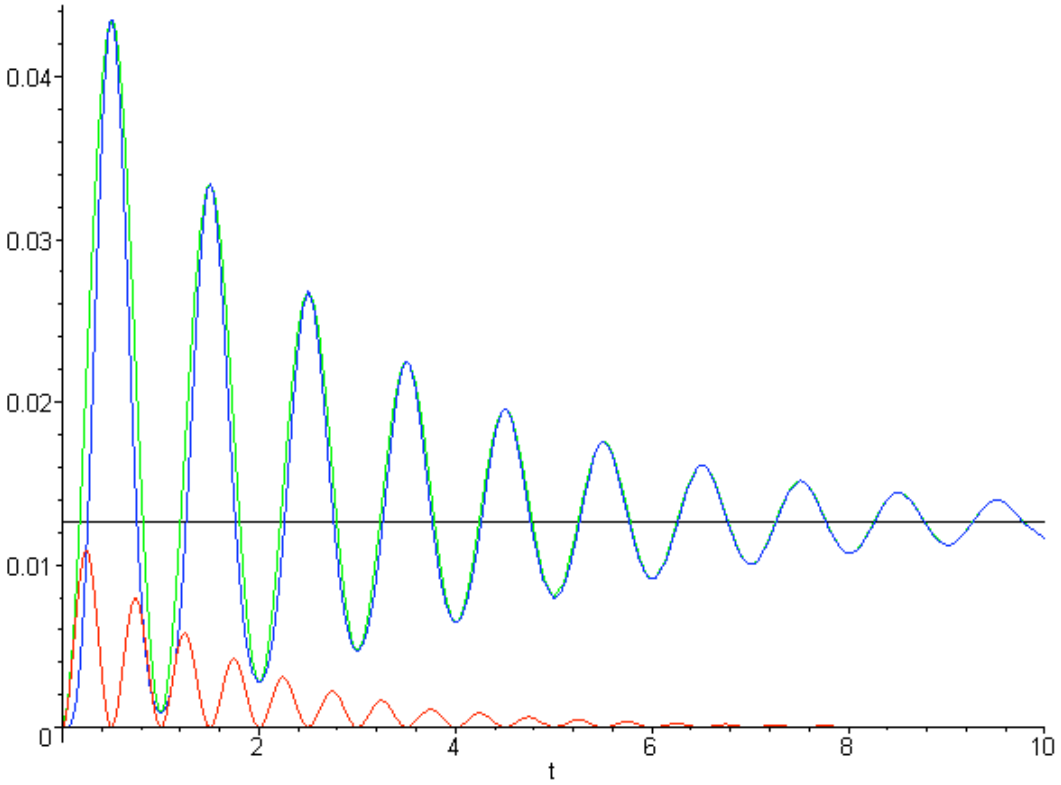


Echelon de tension sur un dipôle RLC série

```
> restart;
>
eqs:=diff(u(t),t$2)+(omega0/Q)*diff(u(t),t)+(omega0)^2*u(t)=(omega0)^2*E:
> dsolve(eqs,u(t)):
> condinit:=u(0)=0,D(u)(0)=0:
> dsolve({eqs,condinit},u(t)):
> assign(%):
> u(t):
> u1:=subs(Q=10,u(t)):
> u1:=evalc(u1):
> simplify(%):
> factor(%):
> u1:=subs(omega0=2*Pi,E=1,u1):
> i:=diff(u1,t)/(4*Pi*Pi):
> plot([i,u1,1],t=0..10,color=[blue,red,black]);
```

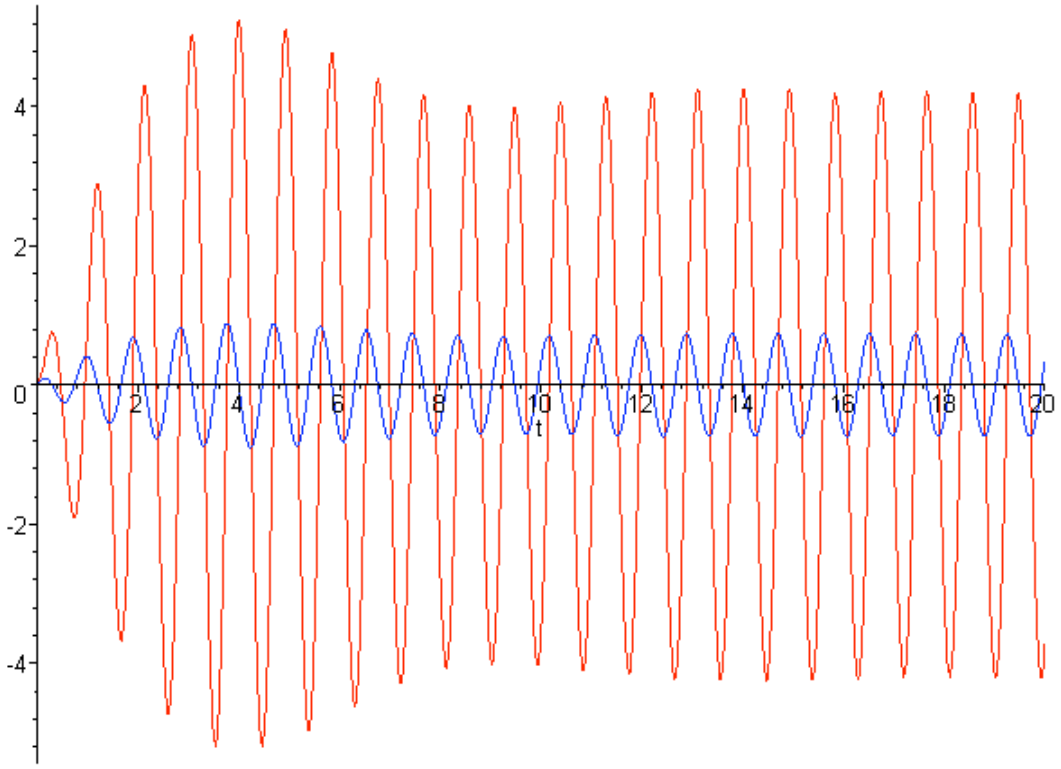



```
> EL:=i*i/2:EC:=u1*u1/(8*Pi*Pi):Etot:=EL+EC:
>
plot([EL,EC,Etot,1/(8*Pi*Pi)],t=0..10,color=[red,blue,green,bl
ack]);
```



Etablissement d'une tension sinusoidale

```
> restart;
;eqs:=diff(u(t),t$2)+2*Pi/10*diff(u(t),t)+(2*Pi)^2*u(t)=(2*Pi)^
2*cos(1.1*2*Pi*t):
> condinit:=u(0)=0,D(u)(0)=0:
> dsolve({eqs,condinit},u(t)):
> assign(%):
> i:=diff(u(t),t)/(4*Pi*Pi):
> plot([i,u(t)],t=0..20,color=[blue,red]);
```


4
2
0
-2
-4
2
4
6
8
10
12
14
16
18
20
t