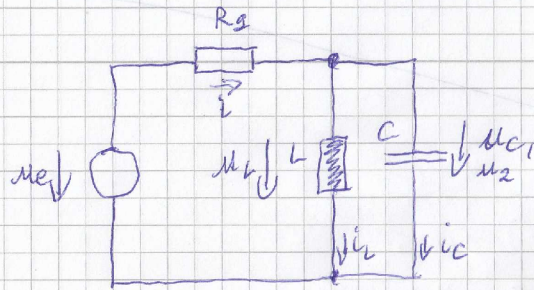


```
In[1]:= Import["d:\\Rescue\\Merken-nbs-mnbs\\Differentialgleichungen\\RLC_Diff_Ein.jpg"]  
|importiere
```



$$u_{R_g} + u_L = u_e \quad (1)$$

$$u_{R_g} + u_C = u_e$$

$$-u_L + u_C = 0$$

$$i_L + i_C = i \quad (2)$$

$$R_g \cdot i + L \dot{i}_L = u_e \quad (1)$$

$$i = i_L + C \cdot \dot{u}_C$$

$$\dot{i} = \dot{i}_L + C \cdot \dot{u}_C$$

$$\dot{i} = \dot{i}_L + C \cdot d(L \cdot \dot{i}_L) / dt$$

$$\dot{i} = \dot{i}_L + LC \cdot \ddot{i}_L \quad (2) \quad | \quad (2 \text{ in } 1)$$

$$R(i_L + LC \cdot \ddot{i}_L) + L \dot{i}_L = u_e \quad | \quad \text{sortieren}$$

$$RLC \ddot{i}_L + L \dot{i}_L + R \cdot i_L = u_e //$$

Out[1]=

```
In[2]:= ClearAll[il, f0, Rg, Cc, L1, ue, erg];
```

[lösche alle](#)

```
In[3]:= f0 = 5*^3; Rg = 1000; Cc = 100*^-9;
```

```
L1 = 1 / ( (2 * Pi * f0) ^2 * Cc );
```

[Kreiszahl \$\pi\$](#)

```
ue[t_] := Sin[2 * Pi * f0 * t];
```

[Sinus](#) [Kreiszahl \$\pi\$](#)

```
In[6]:= erg = DSolve[{il'[t] + 1 / Rg / Cc * il'[t] + 1 / L1 / Cc * il[t] == ue[t] / Rg / L1 / Cc, il[0] == 0, il'[0] == 0}, il[t], t] // Simplify
```

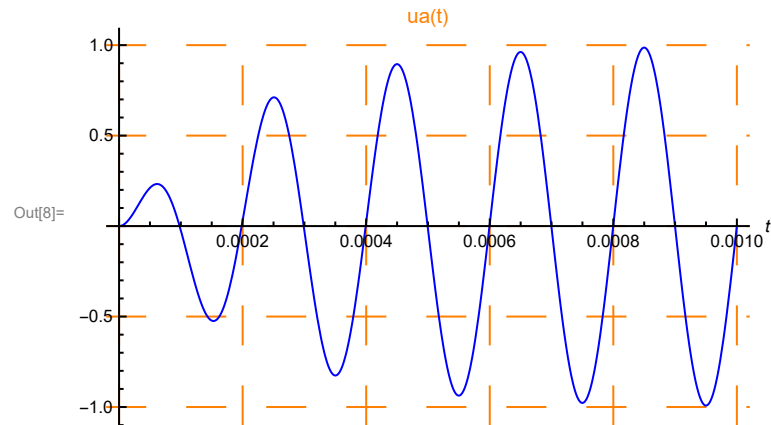
[löse Differentialgleichung](#)

[vereinfache](#)

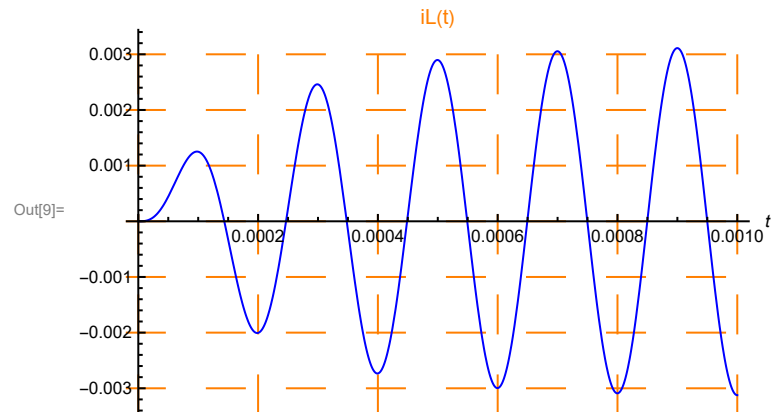
$$\text{Out[6]} = \left\{ \left\{ \text{il}[t] \rightarrow -\frac{1}{2000 \sqrt{-1 + 4 \pi^2}} \right. \right. \\ \left. e^{-5000 t} \pi \left(\cos \left[5000 \sqrt{-1 + 4 \pi^2} t \right] \left(-2 \sqrt{-1 + 4 \pi^2} + e^{5000 t} \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) \cos \left[5000 \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] + e^{5000 t} \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) \right. \right. \right. \\ \left. \left. \cos \left[5000 \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] - e^{5000 t} \sin \left[5000 \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] - e^{5000 t} \sin \left[5000 \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] \right) + \right. \\ \left. \sin \left[5000 \sqrt{-1 + 4 \pi^2} t \right] \left(-2 + e^{5000 t} \cos \left[5000 \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] + e^{5000 t} \cos \left[5000 \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] + \right. \right. \\ \left. \left. 2 e^{5000 t} \pi \sin \left[5000 \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] + e^{5000 t} \sqrt{-1 + 4 \pi^2} \sin \left[5000 \left(-2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] - \right. \right. \\ \left. \left. 2 e^{5000 t} \pi \sin \left[5000 \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] + e^{5000 t} \sqrt{-1 + 4 \pi^2} \sin \left[5000 \left(2 \pi + \sqrt{-1 + 4 \pi^2} \right) t \right] \right) \right) \right\} \right\}$$

```
In[7]:= il[t_] = il[t] /. erg[[1]];
```

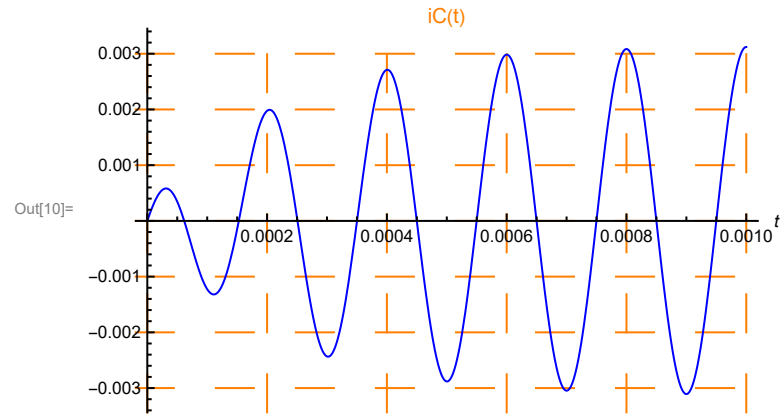
```
In[8]:= Plot[L1 * il'[t], {t, 0, 5 / f0}, AxesOrigin -> {0, 0}, GridLines -> Automatic,
[stelle Funktion graphisch dar [Achsenursprung [Gitternetzlinien [automatisch
GridLinesStyle -> Directive[Orange, Dashed], PlotLabel -> "ua(t)", AxesLabel -> {}, PlotStyle -> {Thin, Blue}, PlotRange -> Full]
[Stil der Gitternetzlinien [Anweisung [orange [gestrichelt [Beschriftung der Graphik [Achsenbeschriftung [Darstellungsstil [dünn [blau [Koordinatenb... [komple
```



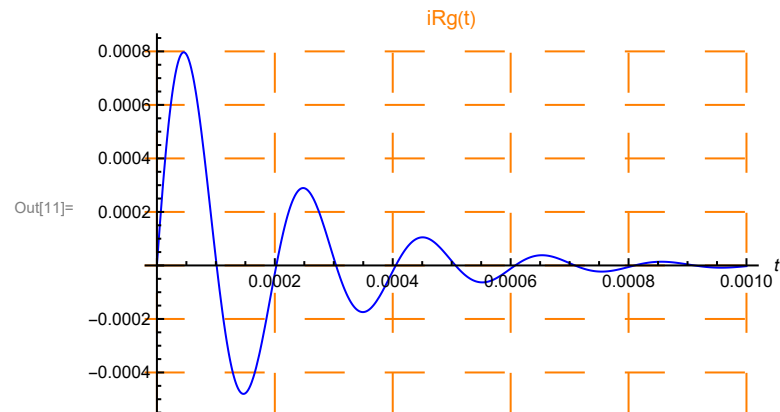
```
In[9]:= Plot[il[t], {t, 0, 5 / f0}, AxesOrigin -> {0, 0}, GridLines -> Automatic, GridLinesStyle -> Directive[Orange, Dashed],
[stelle Funktion graphisch dar [Achsenursprung [Gitternetzlinien [automatisch [Stil der Gitternetzlinien [Anweisung [orange [gestrichelt
PlotLabel -> "iL(t)", AxesLabel -> {}, PlotStyle -> {Thin, Blue}, PlotRange -> Full]
[Beschriftung der Graphik [Achsenbeschriftung [Darstellungsstil [dünn [blau [Koordinatenb... [komplett
```



In[10]:= **Plot**[Cc * Ll * il''[t], {t, 0, 5 / f0}, AxesOrigin → {0, 0}, GridLines → Automatic,
 [stelle Funktion graphisch dar [Achsenursprung [Gitternetzlinien [automatisch
GridLinesStyle → Directive[Orange, Dashed], PlotLabel → "iC(t)", AxesLabel → {}, PlotStyle → {Thin, Blue}, PlotRange → Full]
 [Stil der Gitternetzlinien [Anweisung [orange [gestrichelt [Beschriftung der Graphik [Achsenbeschriftung [Darstellungsstil [dünn [blau [Koordinatenb... [komple]



In[11]:= **Plot**[il[t] + Cc * Ll * il''[t], {t, 0, 5 / f0}, AxesOrigin → {0, 0}, GridLines → Automatic,
 [stelle Funktion graphisch dar [Achsenursprung [Gitternetzlinien [automatisch
GridLinesStyle → Directive[Orange, Dashed], PlotLabel → "iRg(t)", AxesLabel → {}, PlotStyle → {Thin, Blue}, PlotRange → Full]
 [Stil der Gitternetzlinien [Anweisung [orange [gestrichelt [Beschriftung der Graphik [Achsenbeschriftung [Darstellungsstil [dünn [blau [Koordinatenb... [komple]



```
In[12]:= Plot[Rg * (il[t] + Cc * Ll * il''[t]), {t, 0, 5 / f0}, AxesOrigin -> {0, 0}, GridLines -> Automatic,
[stelle Funktion graphisch dar] [Achsenursprung] [Gitternetzlinien] [automatisch]
GridLinesStyle -> Directive[Orange, Dashed], PlotLabel -> "uRg(t)", AxesLabel -> {}, PlotStyle -> {Thin, Blue}, PlotRange -> Full]
[Stil der Gitternetzlinien] [Anweisung] [orange] [gestrichelt] [Beschriftung der Graphik] [Achsenbeschriftung] [Darstellungsstil] [dünn] [blau] [Koordinatenb...] [komple]
```

