

```
> restart
> Equation := L·diff(II(t), t) + R·II(t) = 120·Heaviside(t - 6)·sin(60(t - 6))
      Equation := L ( d/dt II(t) ) + R II(t) = 120 Heaviside(t - 6) sin(60 t - 360) (1)
```

```
> InitCond := II(0) = 0
      InitCond := II(0) = 0 (2)
```

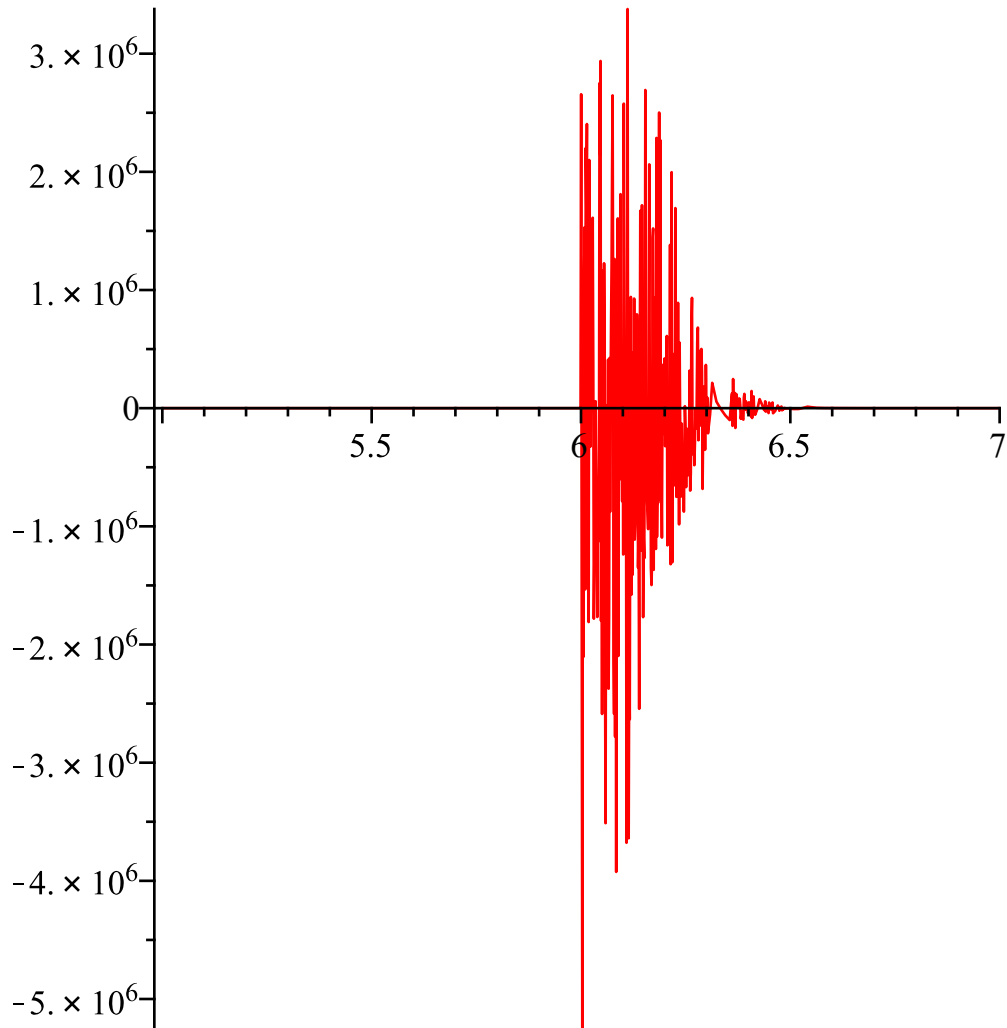
```
> L := 1; R := 2
      L := 1
      R := 2 (3)
```

```
> Equation
      d/dt II(t) + 2 II(t) = 120 Heaviside(t - 6) sin(60 t - 360) (4)
```

```
> with(inttrans) :
> LapTransfEquation := subs(InitCond, laplace(Equation, t, s))
      LapTransfEquation := s laplace(II(t), t, s) + 2 laplace(II(t), t, s) = 7200 e-6s / (s2 + 3600) (5)
```

```
> LapTransfPartSol := isolate(LapTransfEquation, laplace(II(t), t, s))
      LapTransfPartSol := laplace(II(t), t, s) = 7200 e-6s / ((s2 + 3600) (s + 2)) (6)
```

```
> ParticularSolution := (invlaplace(LapTransfPartSol, s, t)) :
> plot(rhs(ParticularSolution), t = 5..7)
```



> rhs(LapTransfPartSol)

$$\frac{7200 e^{-6s}}{(s^2 + 3600)(s + 2)} \quad (7)$$

> Eq := 7200·exp(-6 s) = expand(A·(s·2 + 3600) + (B·s + D)·(s + 2))

$$Eq := 7200 e^{-6s} = A s^2 + 3600 A + B s^2 + 2 B s + D s + 2 D \quad (8)$$

> Sist := A + B = 0, 2·B + D = 0, 3600·A + 2·D = lhs(Eq) : Sist₁; Sist₂; Sist₃

$$A + B = 0$$

$$2 B + D = 0$$

$$3600 A + 2 D = 7200 e^{-6s} \quad (9)$$

> SOL := solve({Sist}, {A, B, D})

$$SOL := \left\{ A = \frac{1800}{901} e^{-6s}, B = -\frac{1800}{901} e^{-6s}, D = \frac{3600}{901} e^{-6s} \right\} \quad (10)$$

> TLPS := laplace(III(t), t, s) = rhs(SOL₁)· $\left(\frac{1}{s+2}\right)$ + rhs(SOL₂)· $\left(\frac{s}{s\cdot 2 + 3600}\right)$
+ rhs(SOL₃)· $\left(\frac{1}{s\cdot 2 + 3600}\right)$

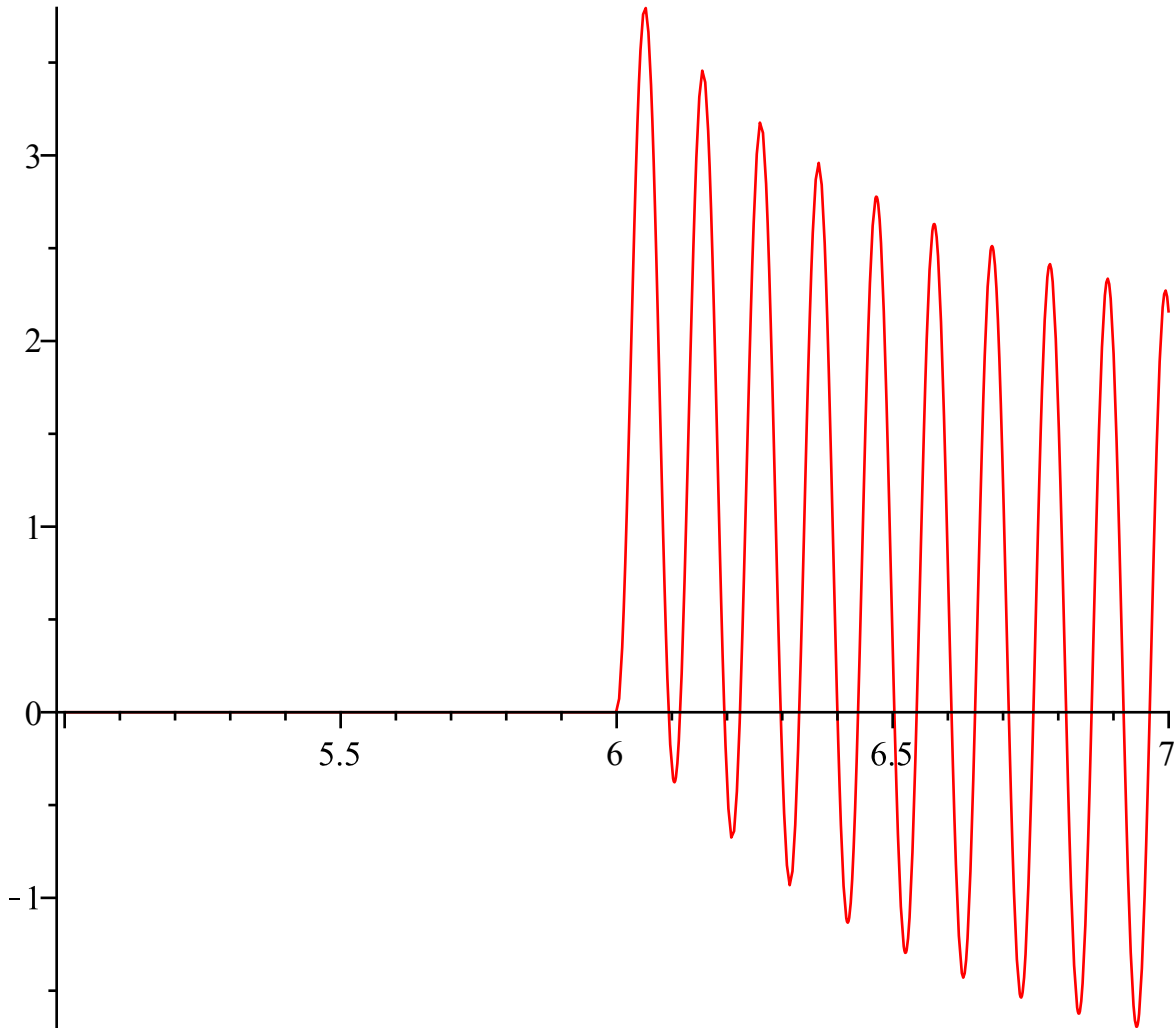
(11)

$$TLPS := \text{laplace}(III(t), t, s) = \frac{1800}{901} \frac{e^{-6s}}{s+2} - \frac{1800}{901} \frac{e^{-6s}s}{s^2+3600} + \frac{3600}{901} \frac{e^{-6s}}{s^2+3600} \quad (11)$$

> PartSol := invlaplace(TLPS, s, t)

$$PartSol := III(t) = \frac{60}{901} \text{Heaviside}(t-6) (30 e^{-2t+12} - 30 \cos(60t-360) + \sin(60t-360)) \quad (12)$$

> plot(rhs(PartSol), t=5..7)

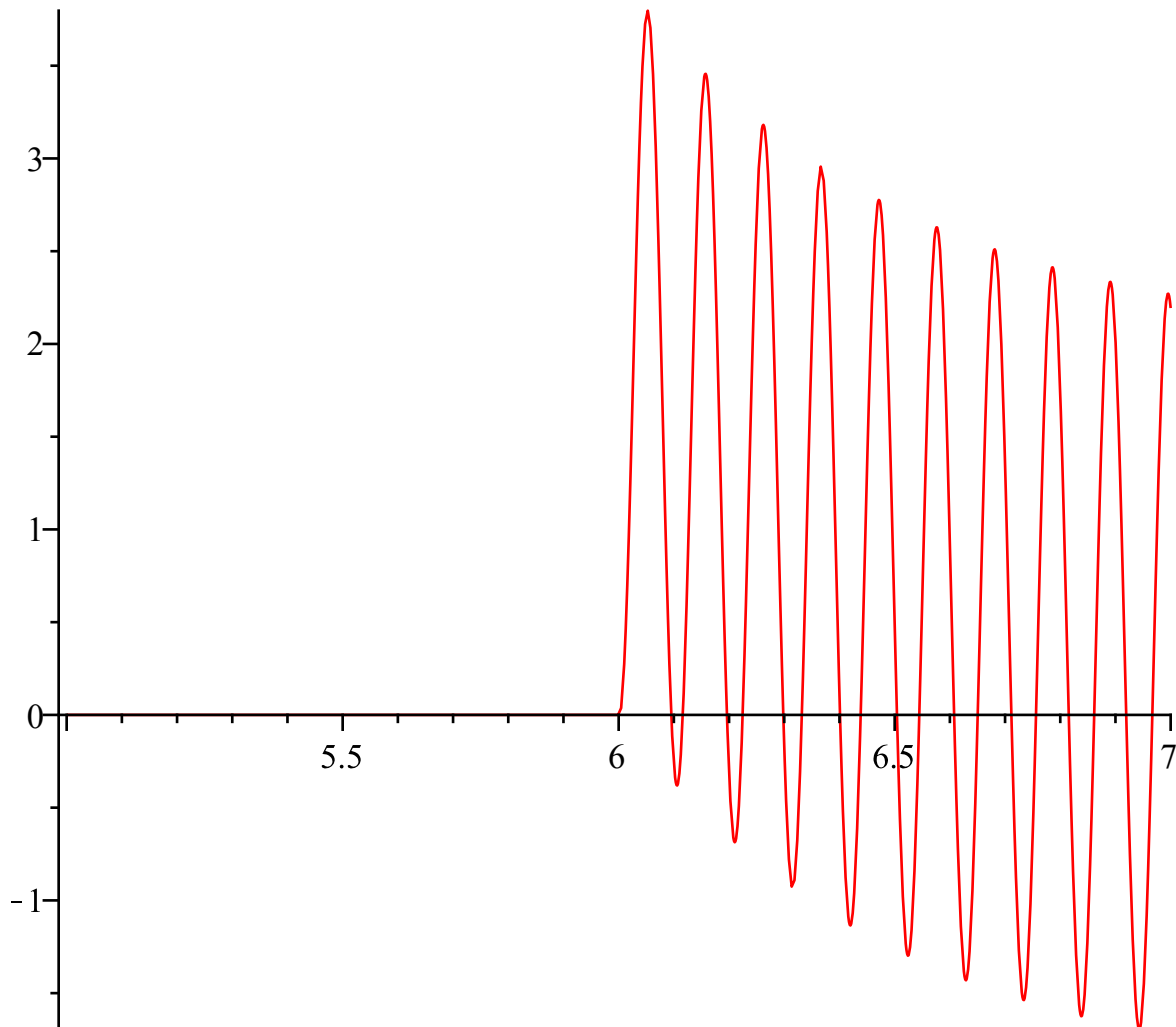


>

$$I(t) = \frac{7200}{3604} \mathcal{U}(t-6) e^{-2(t-6)} - \frac{7200}{3604} \mathcal{U}(t-6) \cos(60(t-6)) - \frac{14400}{3604 \times 60} \mathcal{U}(t-6) \sin(60(t-6))$$

$$\begin{aligned}
 &> \text{PartSol} := II(t) = \frac{7200}{3604} \cdot \text{Heaviside}(t-6) \cdot \exp(-2(t-6)) - \frac{7200}{3604} \cdot \text{Heaviside}(t-6) \\
 &\quad \cdot \cos(60(t-6)) - \frac{14400}{(3604) \cdot (60)} \cdot \text{Heaviside}(t-6) \cdot \sin(60(t-6)) \\
 &\text{PartSol} := II(t) = \frac{1800}{901} \text{Heaviside}(t-6) e^{-2t+12} - \frac{1800}{901} \text{Heaviside}(t-6) \cos(60t-360) \quad (13) \\
 &\quad - \frac{60}{901} \text{Heaviside}(t-6) \sin(60t-360)
 \end{aligned}$$

$\Rightarrow \text{plot}(\text{rhs}(\text{PartSol}), t=5..7)$



\Rightarrow