According

$$e^{\widetilde{\alpha}n}\cos\widetilde{\omega}n \quad \doteqdot \quad \frac{(e^q - e^{\widetilde{\alpha}}\cos\widetilde{\omega})e^q}{e^{2q} - 2e^q e^{\widetilde{\alpha}}\cos\widetilde{\omega} + e^{2\widetilde{\alpha}}}$$

$$e^{\widetilde{\alpha}n}\sin\widetilde{\omega}n \quad \doteqdot \quad \frac{e^q e^{\widetilde{\alpha}}\sin\widetilde{\omega}}{e^{2q} - 2e^q e^{\widetilde{\alpha}}\cos\widetilde{\omega} + e^{2\widetilde{\alpha}}}$$

and matrix in equation (4) we got:

$$e^{2\widetilde{\alpha}} = e^{-2\alpha T}$$

$$2\cos\widetilde{\omega} = \left(e^{\alpha(1-\gamma)T} + e^{-\alpha(1-\gamma)T}\right)\cos(\omega\gamma T) + \frac{\alpha}{\omega}\left(e^{\alpha(1-\gamma)T} - e^{-\alpha(1-\gamma)T}\right)\sin(\omega\gamma T)$$

and change parts in brackets

$$\widetilde{\omega} = \arccos\left[\cosh\left(\alpha(1-\gamma)T\right)\cos(\omega\gamma T) + \frac{\alpha}{\omega}\sinh\left(\alpha(1-\gamma)T\right)\sin(\omega\gamma T)\right]$$

```
on rounded;
R:=1157.76;
L:=0.102;
C:=0.75*10^(-6);
u:=85;

g := 0.5;
t := 0.0002;

a:=1/(2*R*C);
w := a*sqrt(4*R*R*C/L -1);

wtilde:= acos(cosh(a*t*(1-g))*cos(g*w*t) + sinh(a*t*(1-g))*sin(g*w*t)*a/w);
```

$$\cos\widetilde{\omega} = 0.941773223936$$

$$\widetilde{\omega} = 0.342930829999$$

For

$$\cos(\widetilde{\omega}n) = \cos(0.342930829999\, n)$$

Whole period $n = \frac{2\pi}{0.342930829999} \approx 18$

which correspond to graph (fig. 4) for ngspice, period of oscillations covers 18 ripples