In[1]:=
```
pom = pom;
Remove["Global`*"];
Off[FindMinimum::sszero];
$HistoryLength = 2;
SetDirectory[NotebookDirectory[]];
Off[NIntegrate::ncvb];
```

In[7]:=
```
Rs = 0.001;
Ls = 0.000001;
L = 0.000000173;
R1 = 0.000669;
R2 = 0.000669;
R3 = 0.000669;
Ampl = 500.;
ω = 314.;
T = 2 * Pi / ω;
ut1 = Ampl * Sin[ω * t];
ut2 = Ampl * Sin[ω * t - 2 π / 3];
ut3 = Ampl * Sin[ω * t + 2 π / 3];
ut1,2 = ut1 - ut2;
ut1,3 = ut1 - ut3;
ut3,2 = ut3 - ut2;
Gmin = 0.00008;
Lg1 = 10 + 0 * Sin[0.1 * ω * t];
SeedRandom[1];
Lg2 = 10 + 0 * Sin[0.08 * ω * t + Random[]];
Lg3 = 10 + 0 * Sin[0.11 * ω * t + Random[]];
α = 0.05;
(*pripadne 0.0005*)
I0 = 10(*A*);
ϕ0 = 0.0001;
ϕ1 = 0.0001;
P0 = 1000;
A = 40;
B = 10(*V na cm*);
g0 = 100.;(*poc vodivost*)
```

In[35]:=
```
ClearAll[derg];
derg[i_, g_, Lg_] := Module[{ena, den, nom},
  ena = E^(-i^2 / I0^2);
  den = (-ϕ0 - ϕ1 * E^(-α*Abs[i]));
  nom = g - Gmin - i^2 / (g * (A + B * Lg)^2) * (1 - ena) - i^2 / P0 * ena;
  nom / den
 ];
```

In[37]:=
```
matMrel = {{1, 0.5, 0.4}, {0.5, 1, 0.5}, {0.4, 0.5, 1}};(*Matrix of relative mutual inductances *)
dersis = {i1'[t], i2'[t], i3'[t]};
```

In[39]:=
```
uf := Union[Flatten[#]] &;
rceg := {g#[t] * u#[t] == i#[t], g#'[t] == derg[i#[t], g#[t], Lg#], g#[0] == g0} &;
rg = uf@(rceg /@ Range[3]);
rcePrivod := {uin#[t] - u#[t] == R# * i#[t] + L * (matMrel.dersis)[[#]], i#[0] == 0} &;
rp = uf@(rcePrivod /@ Range[3]);
rTrafo[{k1_, k2_}] :=
  {uink1[t] - uink2[t] == Ls * ik1,k2'[t] + ik1,k2[t] * Rs + utk1,k2, ik1,k2[0] == 0};
rT = uf@(rTrafo /@ {{1, 2}, {1, 3}, {3, 2}});
r123 = {0 == i1[t] + i1,2[t] + i1,3[t], i2[t] == i3,2[t] + i1,2[t], i3[t] == -i3,2[t] + i1,3[t]};
rDohr = Union[rg, rp, rT, r123];
nezname = Union[Cases[rDohr, _[t], {0, ∞}] /. {a_'[t] :> a, a_[t] :> a}];
tmax = 5 T;
res = NDSolve[rDohr, nezname, {t, 0, tmax}, StartingStepSize → 10^-16, MaxSteps → 10^6,
    SolveDelayed → False, MaxStepSize → 10^-3 T, AccuracyGoal → 6, PrecisionGoal → 4][[1]];
```

```
Plot[Evaluate[{i1,2[t], i1,3[t], i3,2[t]} /. res],
 {t, tmax - T, tmax}, PlotRange → All, AxesLabel → {"t [s]", "i123 [A]"}]
```

Out[51]=