

# Zkratový proud alternátoru

## Purpose

Pr b h satorového a rotorového proudu p i zkratu na synchronním alternátoru s tlumi em.

## System

## Sites of Interaction

## System Parameters

$$U_n = 13.8$$

$$P_n = 115$$

$$S_n = 127.8$$

$$C_{osFi} = 0.9$$

$$I_n = 5350$$

$$I_{fn} = 1520$$

$$I_{f0} = 810$$

$$U_{fn} = 270$$

$$U_{f0} = 104$$

$$X_d = 116/100$$

$$X_q = 77/100$$

$$X_{dc} = 48/100$$

$$X_{dcc} = 29/100$$

$$X_{qcc} = 31/100$$

$$X_{sigma} = 22/100$$

$$X_2 = 30/100$$

$$R_s = 0.00494$$

$$R_f = 0.129$$

$$R_{vd} = 0.062$$

$$T_{d0c} = 7.1$$

$$T_{d0cc} = 2.033$$

$$T_{dc} = 2.3$$

$$T_{dcc} = 0.02$$

$$T_{q0cc} = 0.0373$$

$$T_{qcc} = 0.015$$

$$T_a = 0.28$$

$$O_{mega} = 314.15926$$

$$E_0 = 4$$

$$U_{q0} = 1$$

$$U_{d0} = 0.5$$

$$T_{\text{theta}0} = 0$$

$$I_{fu} = 1$$

## System excitation

## Task

## Assumptions

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## Solution

## Model

## Data

\*: Zkratový proud alternátoru

\*SYSTEM;

: Parametry alternátoru Dalesice dle skript PJS CVUT Cviceni

Un=13.8;

Pn=115;

Sn=127.8;

CosFi=0.9;

In=5350;

Ifn=1520;

If0=810;

Ufn=270;

Uf0=104;

: Reaktance

Xd=116/100;

Xq=77/100;

Xdc=48/100;

Xdcc=29/100;

Xqcc=31/100;

Xsigma=22/100;

X2=30/100;

: Cinne odpory

Rs=0.00494;

Rf=0.129;

Rvd=0.062;

: Casove konstanty

Td0c=7.1;

Td0cc=2.033;

```
Tdc=2.3;
Tdcc=0.02;
Tq0cc=0.0373;
Tqcc=0.015;
Ta=0.28;
```

```
Zn=Un*Un/Sn;
Omega=314.15926;
E0=4;
Uq0=1;
Ud0=0.5;
```

```
: Statorovy rozptyl je v obou osach priblizne stejny
Xdsigma=Xsigma;
Xqsigma=Xsigma;
```

```
: Zbyvajici reaktance a cinne odpory dle IdentifikaceParametruAlternatoru.doc
Xad=Xd-Xdsigma;
Xaq=Xq-Xqsigma;
Xfsigma=1/(1/(Xdc-Xdsigma)-1/Xad);
Xvdsigma=Xad*Xfsigma*(Xdsigma-Xdcc)/(Xad*(Xdcc-Xdsigma-Xfsigma)+Xfsigma*(Xdcc-Xdsigma));
Xvqsigma=1/(1/(Xqcc-Xqsigma)-1/Xaq);
```

```
Xf=Xfsigma+Xad;
Tf=(Xf*Zn/Omega)/Rf;
Xfc=Xf/Xd*Xdc;
Tfc=(Xfc*Zn/Omega)/Rf;
```

```
: Podelna osa tlumice
Xvd=Xvdsigma+Xad;
Xdvdc=Xsigma+Xvdsigma*Xad/(Xvdsigma+Xad);
Xvdc=Xvd/Xd*Xdvdc;
Tvd=(Xvd*Zn/Omega)/Rvd;
Tvdc=Tvd*Xdvdc/Xd;
Tvdc2=(Xvdc*Zn/Omega)/Rvd;
Xadc=Xsigma*Xad/(Xsigma+Xad);
Sigmafdc=1-Xadc*Xadc/Xfc/Xvdc;
Tdcc2=Sigmafdc*Tfc*Tvdc/(Tfc+Tvdc);
Tdc2=Tfc+Tvdc-Tdcc;
```

```
: Pricna osa tlumice
Xvq=Xvqsigma+Xaq;
Xvqc=Xvq/Xq*Xqcc;
Rvq=Rvd;
Tvq=(Xvq*Zn/Omega)/Rvq;
Tqcc2=Tvq*Xqcc/Xq;
Tvqc=Tqcc;
```

```
Ta2=(2*Xdcc*Xqcc/(Xdcc+Xqcc)*Zn/Omega)/Rs;
Tdcc3=Sigmafdc*Tvdc;
```

```
: Komponenty proudu Id
Idu=-E0/Xd;
Idac=-Uq0*(1/Xdc-1/Xd);
Idacc=-Uq0*(1/Xdcc-1/Xdc);
Idomegam=(Uq0*cos(Omega*Time)+Ud0*sin(Omega*Time))/Xdcc;
```

```

Id=Idu + Idac*exp(-Time/Tdc) + Idacc*exp(-Time/Tdcc) + Idomegam*exp(-Time/Ta);

: Komponenty proudu Iq
Iqacc=-Ud0*(1/Xqcc-1/Xq);
Iqomegam=(Uq0*sin(Omega*Time)-Ud0*cos(Omega*Time))/Xqcc;
Iq=Iqacc*exp(-Time/Tqcc) + Iqomegam*exp(-Time/Ta);

: Statorov0 proudy
Theta0=0;
Ia=Id*cos(Omega*Time+Theta0) + Iq*sin(Omega*Time+Theta0);
Ib=Id*cos(Omega*Time+Theta0-2pi/3)+Iq*sin(Omega*Time+Theta0-2pi/3);
Ic=Id*cos(Omega*Time+Theta0-2pi/3)+Iq*sin(Omega*Time+Theta0+2pi/3);

: Rotorove proudy
Ifu=1;
Ifac=-Idac*Xd/Xad*Tf/(Tf+Tvd);
Ifomega=Idacc*(Xdcc-Xsigma)/Xfsigma;
Ifacc=-(Ifomega+Ifac);
If=Ifu + Ifac*exp(-Time/Tdc) + Ifacc*exp(-Time/Tdcc) + Ifomega*exp(-Time/Ta)*cos(Omega*Time);

Ivdac=-Idac*Xd/Xad*Tvd/(Tf+Tvd);
Ivdomega=Idacc*(Xdcc-Xsigma)/Xvdsigma;
Ivdacc=-(Ivdomega+Ivdac);
Ivd=Ivdac*exp(-Time/Tdc) + Ivdacc*exp(-Time/Tdcc) + Ivdomega*exp(-Time/Ta)*cos(Omega*Time);

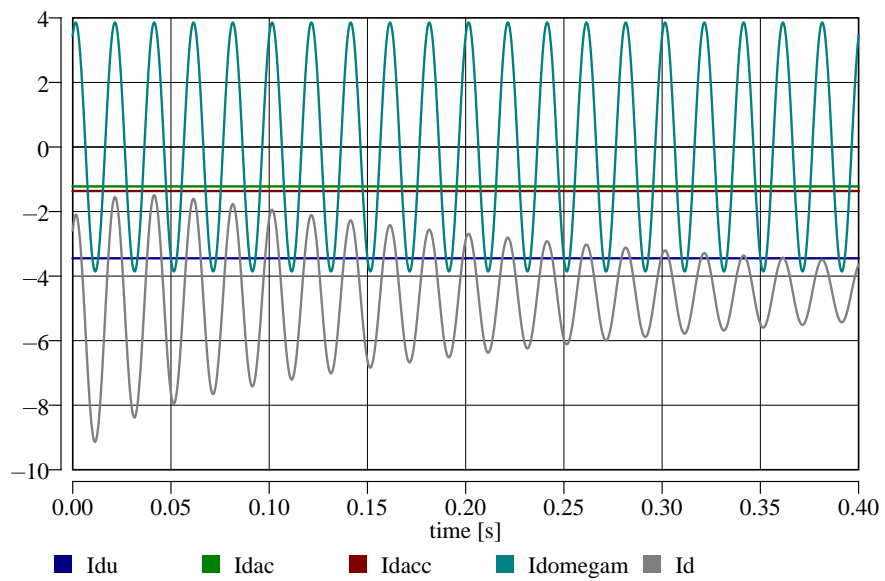
Ivqomega=Iqacc*(Xqcc-Xsigma)/Xvqsigma;
Ivqacc=-Ivqomega;
Ivq=Ivqacc*exp(-Time/Tqcc) + Ivqomega*exp(-Time/Ta)*cos(Omega*Time);

*TR;
TR 0 0.4;
PRINT(4001) Idu, Idac, Idacc, Idomegam,
           Iqacc, Iqomegam, Id, Iq,
           Ia, Ib, Ic;

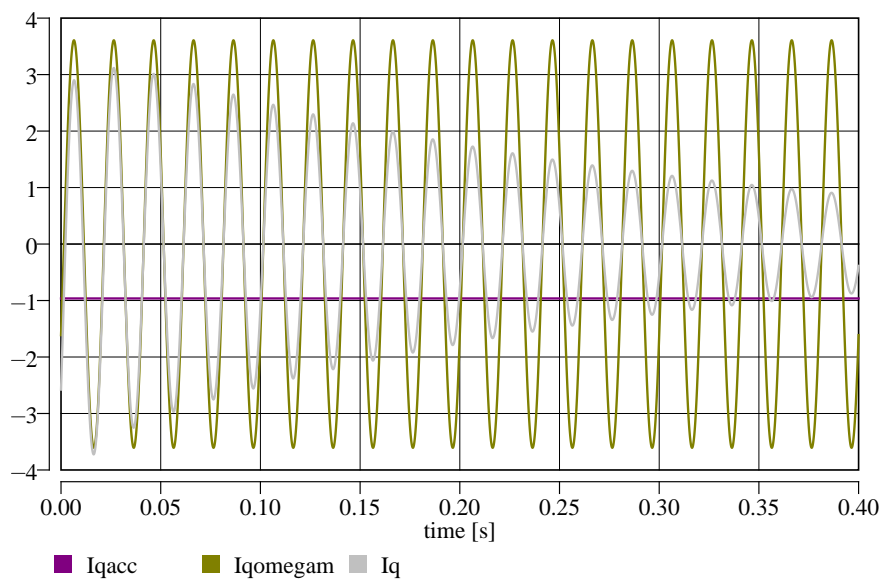
RUN;
*END;

```

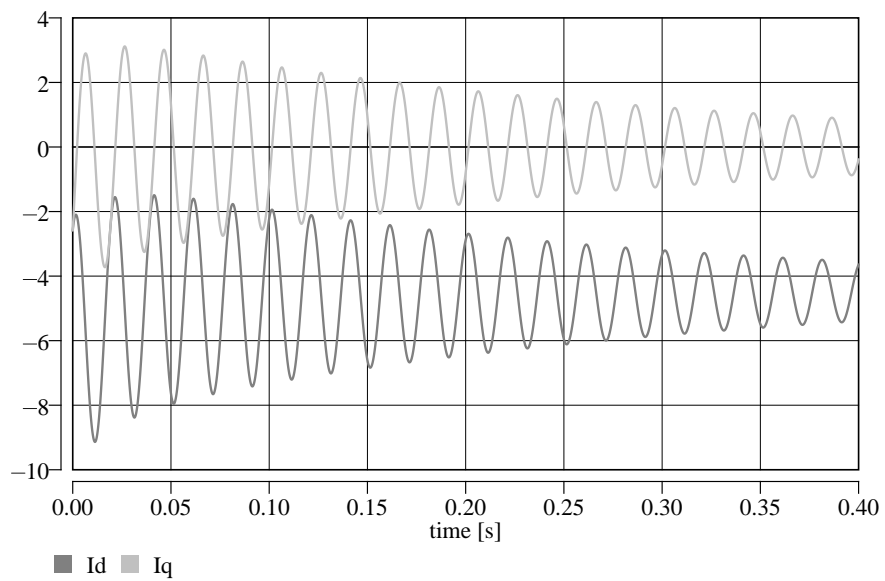
Statorové proudy v ose "d".



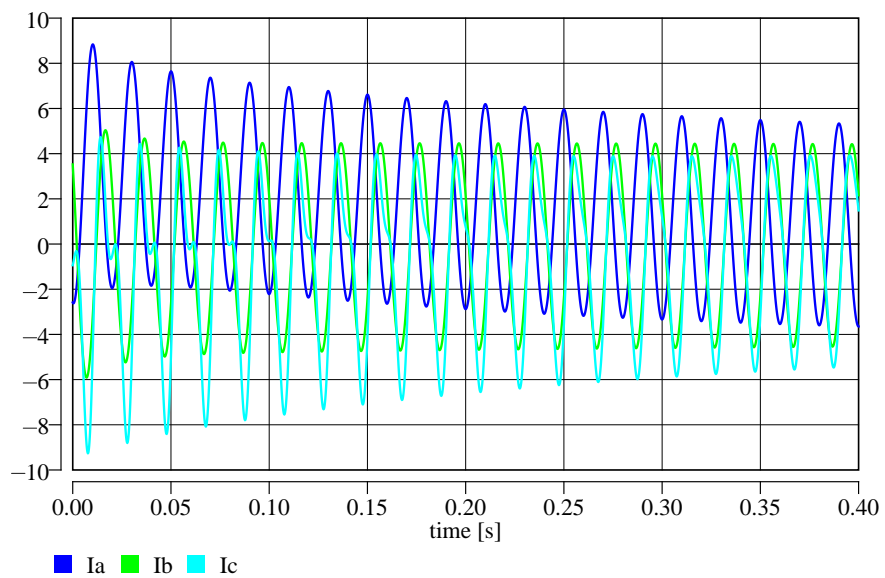
Statorové proudy v ose "q".



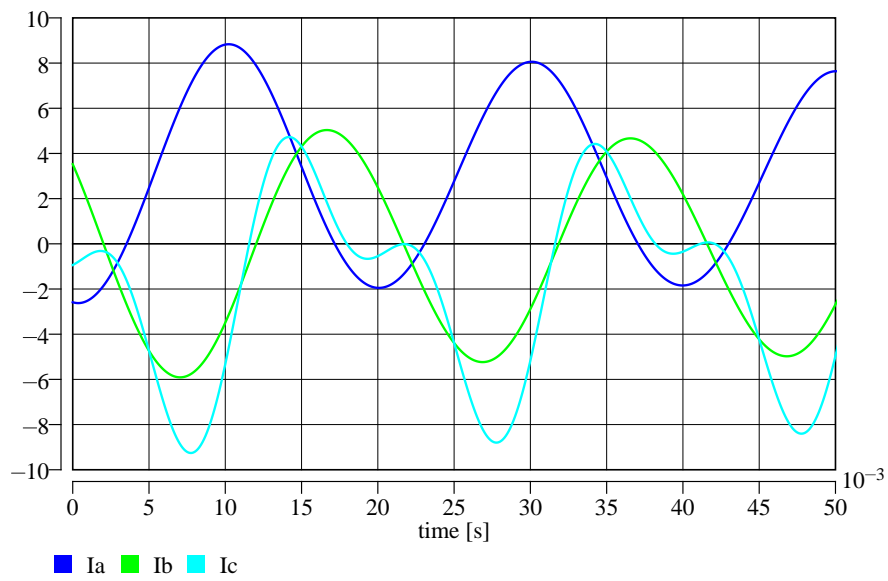
Statorové proudy výsledné v osách "d" a "q".



Statorové proudy fázové v osách "a", "b" a "c".



Statorové proudy fázové v osách "a", "b" a "c" - detail.



### Origin

Karel Nohá KEE, FEL, Z U v Plzni

### Last Update

November 27, 2013