Obliczanie parametrów oraz wartości poczatkowych

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% NOMINALNE WARTOSCI

T\_zewN = -1; % 'C

T\_zN = 24; % 'C

T\_pN = 19; % 'C

T\_wewN = 21; % 'C

f\_pN = 1; % m^3/s

c\_p = 1000; % J/(kg\*K)

ro\_p = 1.2; % kg/m^3

dl = 20; % m

szer = 10; % m

h\_w = 5; % m

h\_p = 1.5; % m

V\_w = dl\*szer\*h\_w; % m

V\_p = dl\*szer\*h\_p/3; % m dach jest ostroslupem

C\_vw = c\_p\*ro\_p\*V\_w; % J/K

C\_vp = c\_p\*ro\_p\*V\_p; % J/k

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Do zmniejszenia zapisu

a=c\_p\*ro\_p\*f\_pN;

% Proporcja K

p=0.25;

% Obliczanie wspolczynnikow K

A = [(T\_wewN-T\_pN), (T\_wewN-T\_zewN);

(T\_wewN-T\_pN), (-p\*(T\_pN-T\_zewN))];

B = [a\*(T\_zN-T\_wewN); 0];

K\_matrix = inv(A)\*B;

% Wspolczynniki przenikalnosci cieplnej K

K\_1=K\_matrix(1,1); % W/K

K\_w=K\_matrix(2,1); % W/K

K\_p=p\*K\_w; % W/K

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

T\_z1 = T\_zN;

T\_zew1= T\_zewN;

f\_p1 = f\_pN;

% Sprawdzenie "Prostej kreski"

% Warunki poczatkowe

T\_wew0 = T\_wewN

T\_p0=T\_pN

% Wartosci skok�w w step'ach

steptime=1000;

d\_T\_z = 0;

d\_f\_p = 0;

d\_T\_zew = 0;

% Warunki poczatkowe dla syulacji w state space

% wartosci poczatkowe2

T\_zew1 = T\_zewN;

T\_wew1 = T\_wewN;

T\_p1 = T\_pN;

f\_p1 = f\_pN;

T\_z1 = T\_zN;

M=1/(K\_1+K\_p);

T\_wew0 = (c\_p\*ro\_p\*f\_p1\*T\_z1+K\_1\*K\_p\*T\_zew1\*M +K\_w\*T\_zew1)/(c\_p\*ro\_p\*f\_p1+K\_1+K\_w-(K\_1^2)\*M);

T\_p0 = (K\_1\*T\_wew0+K\_p\*T\_zew1)\*M;

Przykład symulacji (test prostej kreski)

steptime=1000;

d\_T\_z = 0;

d\_f\_p = 0;

d\_T\_zew = 0;

sim('my\_dom\_model');

% Test prostej kreski

figure

plot(t,T\_wew\_sym1)

hold on;

plot(t,T\_p\_sym1)

grid on;

title('Test prostej kreski, NL');

xlabel('Czas [s]')

ylabel("Temperatura [^{\circ}C]")

legend('T\_{wew}','T\_{p}')

Zmiana punktow pracy

% Zmienione T\_zew, T\_z i f\_p

% wartosci poczatkowe2

T\_zew1 = T\_zewN-5;

T\_wew1 = T\_wewN;

T\_p1 = T\_pN;

f\_p1 = f\_pN-0.35;

T\_z1 = T\_zN+8;

cfp = c\_p\*ro\_p\*f\_pN;

M=1/(K\_1+K\_p);

T\_wew0 = (c\_p\*ro\_p\*f\_p1\*T\_z1+K\_1\*K\_p\*T\_zew1\*M +K\_w\*T\_zew1)/(c\_p\*ro\_p\*f\_p1+K\_1+K\_w-(K\_1^2)\*M);

T\_p0 = (K\_1\*T\_wew0+K\_p\*T\_zew1)\*M;

%-----------------------------------

% T\_z

subplot(3,2,1)

d\_T\_z = 5;

d\_T\_zew = 0;

d\_f\_p = 0;

sim('my\_dom\_model');

plot(t,T\_wew\_sym1)

xlabel('Czas [s]')

ylabel("T\_{wew} [^{\circ}C]")

hold on;

grid on

legend('Wartosci Nominalne','\Delta T\_{z}=-3 ^{\circ}C i \Delta T\_{zew}=+5 ^{\circ}C','\Delta T\_{z}=-3 ^{\circ}C , \Delta T\_{zew}=+5 ^{\circ}C i \Delta f\_{p}=+0.2 m^3/s')

Obliczenie wspolczynnikow dla State Space

% x'= Ax + Bu

% y = Cx + Du

A =[ -(a+K\_1+K\_w)/C\_vw, K\_1/C\_vw ;

K\_1/C\_vp , -(K\_1+K\_p)/C\_vp];

B =[ c\_p\*ro\_p\*f\_pN/C\_vw, K\_w/C\_vw ;

0 , K\_p/C\_vp ];

C=[1,0;

0,1];

D=[0,0;

0,0];

% Warunki poczatkowe dla syulacji w state space

% wartosci poczatkowe2

T\_zew1 = T\_zewN;

T\_wew1 = T\_wewN;

T\_p1 = T\_pN;

f\_p1 = f\_pN;

T\_z1 = T\_zN;

M=1/(K\_1+K\_p);

T\_wew0 = (c\_p\*ro\_p\*f\_p1\*T\_z1+K\_1\*K\_p\*T\_zew1\*M +K\_w\*T\_zew1)/(c\_p\*ro\_p\*f\_p1+K\_1+K\_w-(K\_1^2)\*M);

T\_p0 = (K\_1\*T\_wew0+K\_p\*T\_zew1)\*M;

State\_Space\_Init=[T\_wew0; T\_p0];

Obliczenie Transmitancji

% Funkcja ktora zamienia state space na transmitancje

[L1,M1]=ss2tf(A,B,C,D,1);

[L2,M2]=ss2tf(A,B,C,D,2);

% Badanie modelu skokami

%-----------------------------------

% T\_zN

d\_T\_z = 5; %5

d\_T\_zew = 0; %2

d\_f\_p = 0; %0.2

Przyklad rysowania wszystkich modeli naraz

sim('my\_dom\_model')

subplot(1,1,1)

plot(t,T\_wew\_sym1,'-')

hold on;

sim('my\_dom\_trans')

plot(T\_wew\_trans,'\*')

hold on;

sim('my\_dom\_state\_space')

plot(T\_wew\_state\_space,'o')

hold on

title('Twew od skoku Tz=2')

legend('NL','State Space','Transmitancja')

grid on;

Przyklad sprowadzenia do tego samego poziomu

% f\_p

subplot(3,2,5)

d\_T\_z = 0;

d\_T\_zew = 0;

d\_f\_p = 0.2;

sim('my\_dom\_model');

plot(t,T\_wew\_sym1-T\_wew\_sym1(1,1))

xlabel('Czas [s]')

ylabel("T\_{wew} [^{\circ}C]")

grid on

title('Skok df\_{p}=0.2')

hold on;