

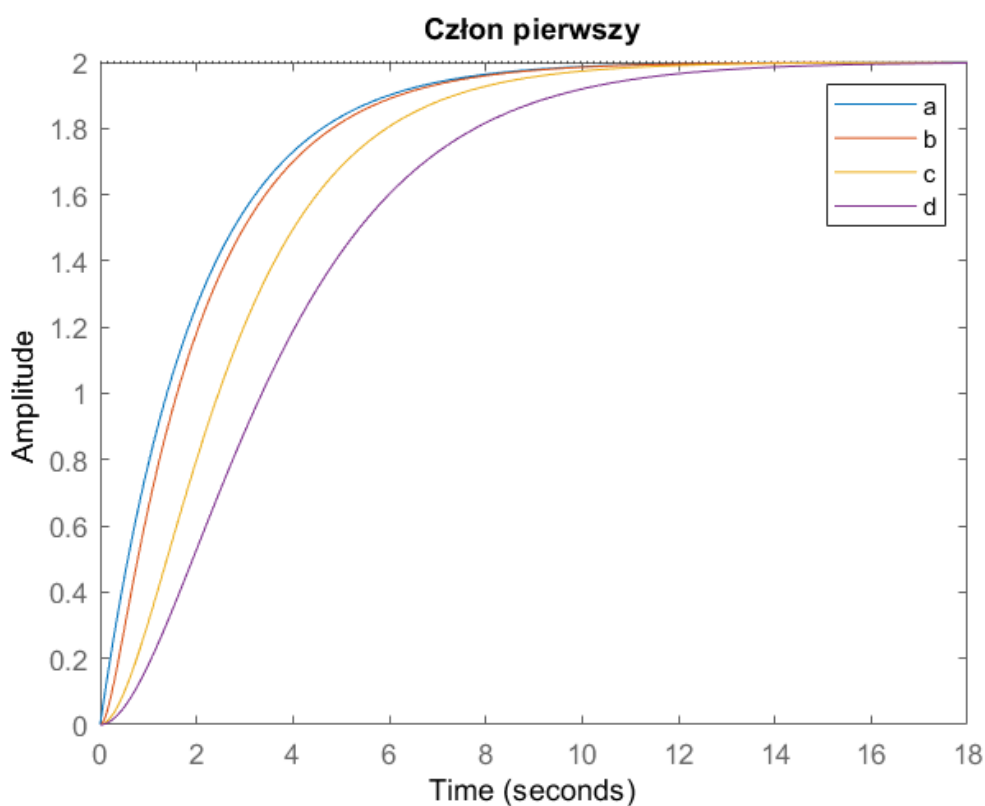
# SPRAWOZDANIE

Modele Układów Dynamiki (czwartek 13:15-15:00)

<b>Data oddania:</b> 17.01.2021	<b>Ćwiczenie:</b> Podstawowe człony
Mikołaj Zapotoczny (252939)	<b>Prowadzący:</b> Dr Anna Czemplik

## 1 Odpowiedzi skokowe dla wskazanych obiektów

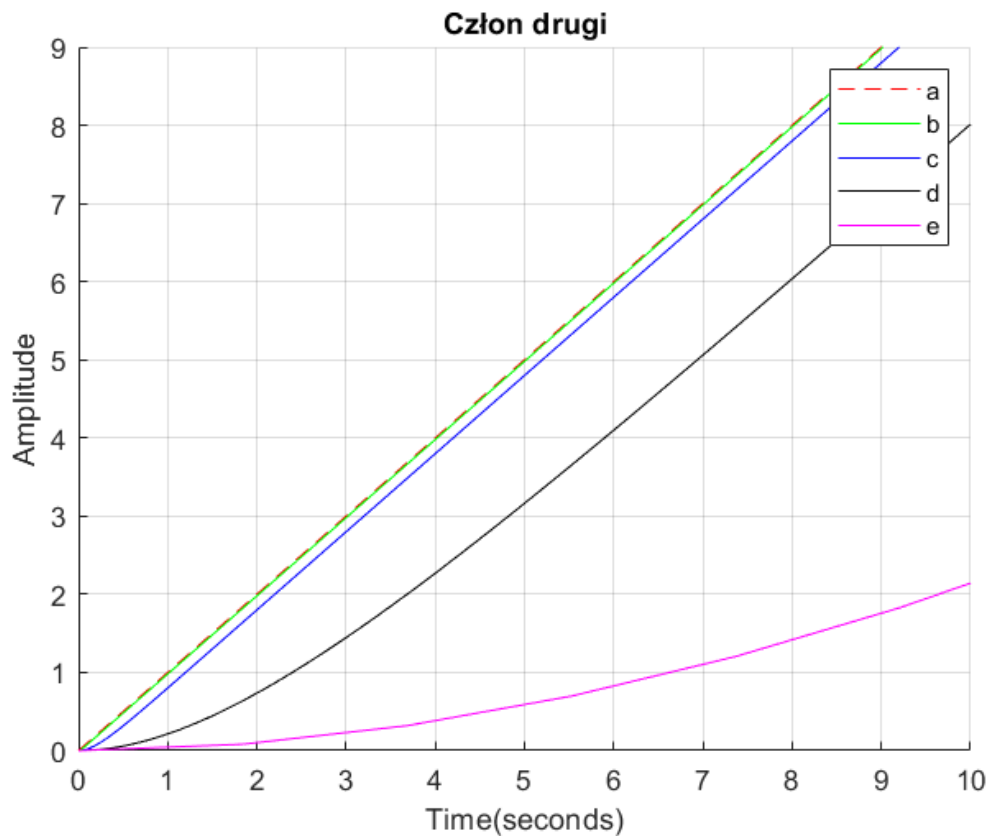
1.1 Odpowiedź dla  $\frac{K}{(T_1s+1)(T_2s+1)}$ ,  $K = 2$ ,  $T_1 = 2$ ,  $T_2 = [0, T_1/10, T_1/2, T_1]$



### 1.1.1 Wnioski

1. Dla podanych wartości układ jest stabilny.
2. Wraz z wzrostem  $T_2$  nie zmienia się ani stan początkowy, ani wartość maksymalna charakterystyki. Zmienia się tylko czas osiągnięcia danego poziomu.

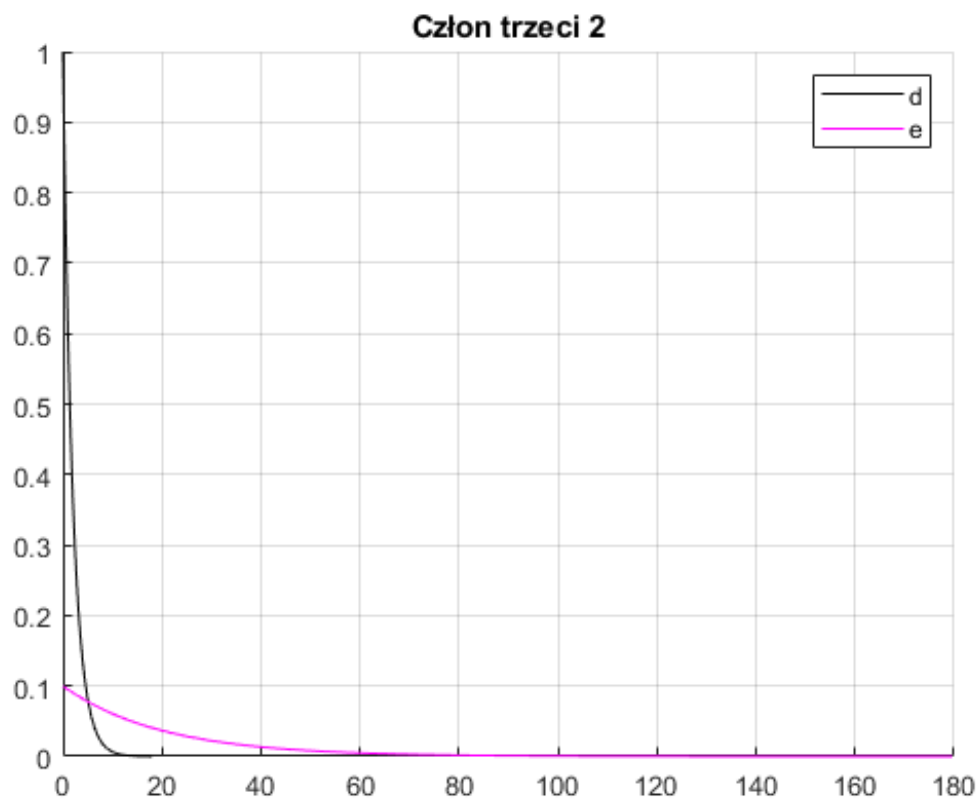
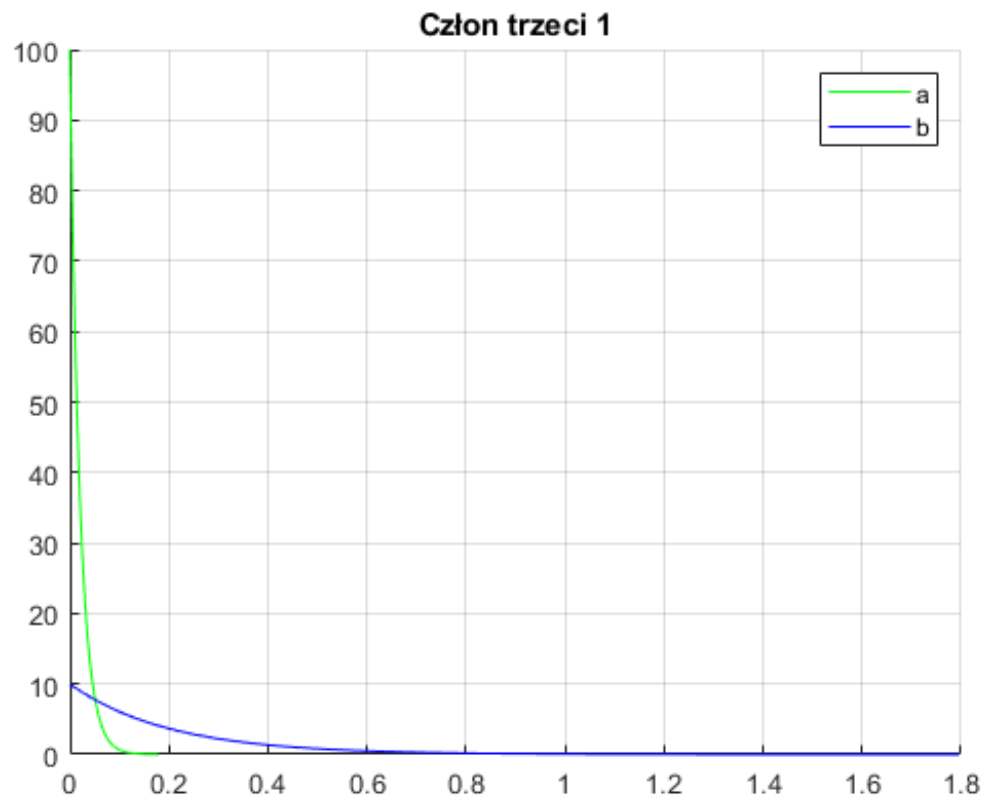
## 1.2 Odpowiedź dla $\frac{K}{T_i s(T_2 s + 1)}$ , $K = 2$ , $T_1 = 2$ , $T_2 = [0, T_2/100, T_2/10, T_2, 10T_2]$



### 1.2.1 Wnioski

1. Dla podanych wartości układ jest niestabilny.
2. Nie można w nim porównać właściwości dynamicznych ani wpływu stałych czasowych na szybkość układu.

### 1.3 Odpowiedź dla $\frac{T_d s}{(T_2 s + 1)}, T_d = 2, T_2 = [0, T_2/100, T_2/10, T_2, 10T_2]$

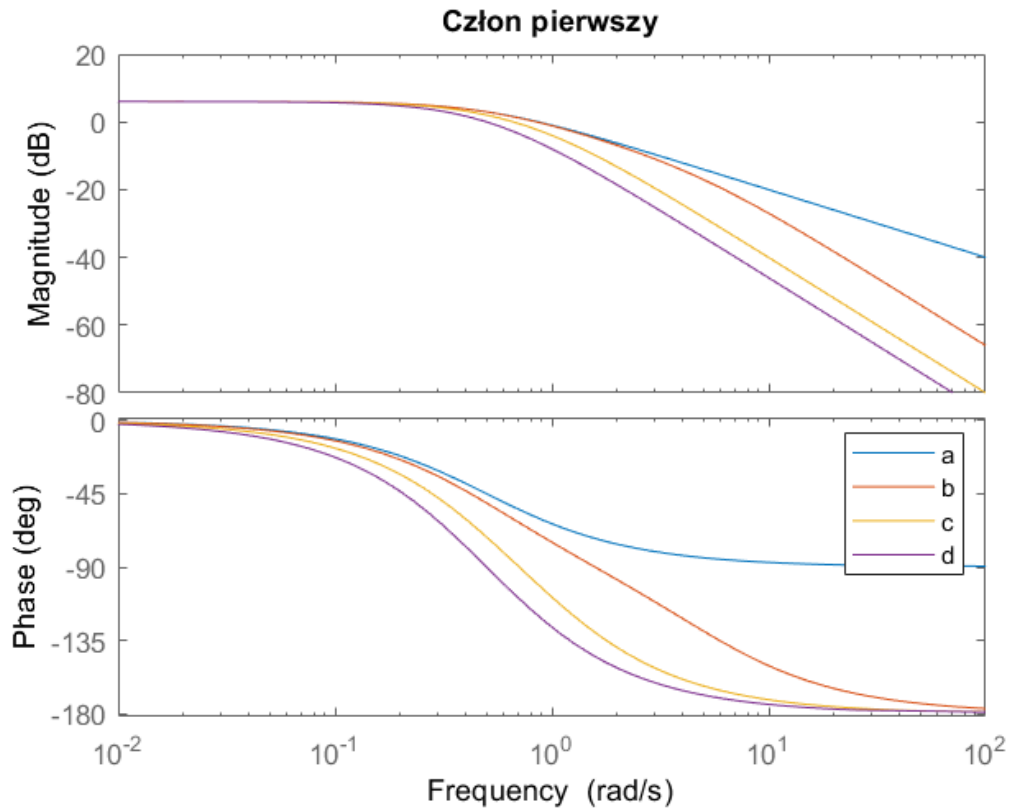


### 1.3.1 Wnioski

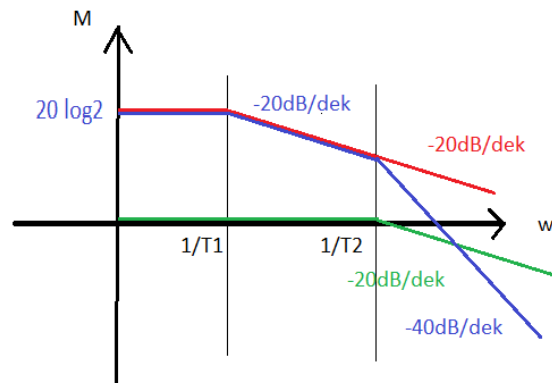
1. Dla wartości  $T_2=0$  otrzymujemy następujący komunikat: "Cannot simulate the time response of improper (non-causal) models." Wynika to z faktu, że otrzymujemy idealny człon różniczkowy. Nie występuje on w żadnym rzeczywistym modelu fizycznym gdyż posiadałby nieskończone wzmocnienie.
2. Dla podanych wartości układ jest stabilny.
3. Wraz z zmniejszeniem  $T_d$  nie zmienia się ani stan początkowy, ani wartość maksymalna charakterystyki. Zmienia się tylko czas osiągnięcia danego poziomu.

## 2 Charakterystyki częstotliwościowe

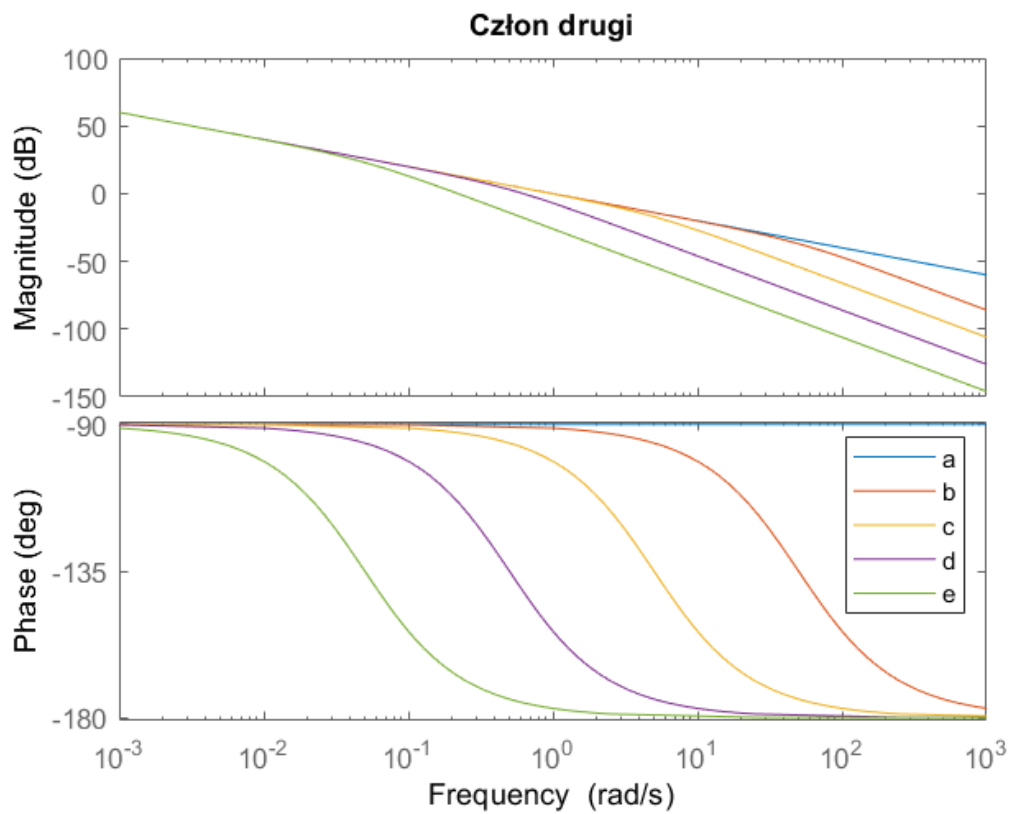
### 2.1 Charakterystyka amplitudowa oraz fazowa dla członu nr 1



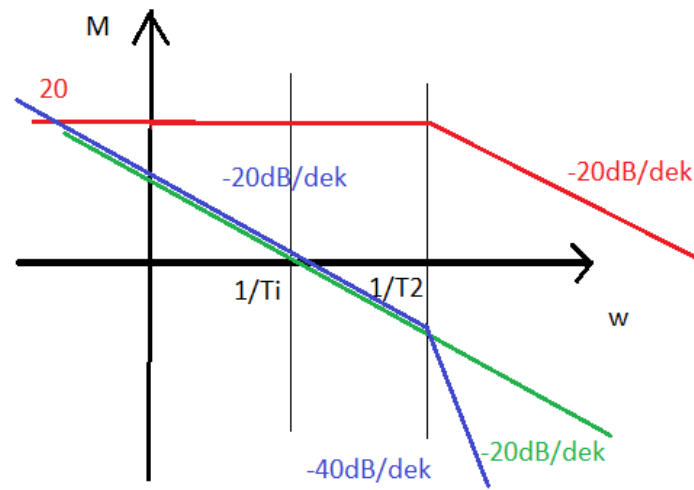
$$\frac{K}{(T_1s+1)(T_2s+1)}; K = 2; T_1 = 2; T_2 = \frac{T_1}{2}; \frac{2}{(2s+1)(s+1)}; \frac{1}{T_1} < \frac{1}{T_2}$$



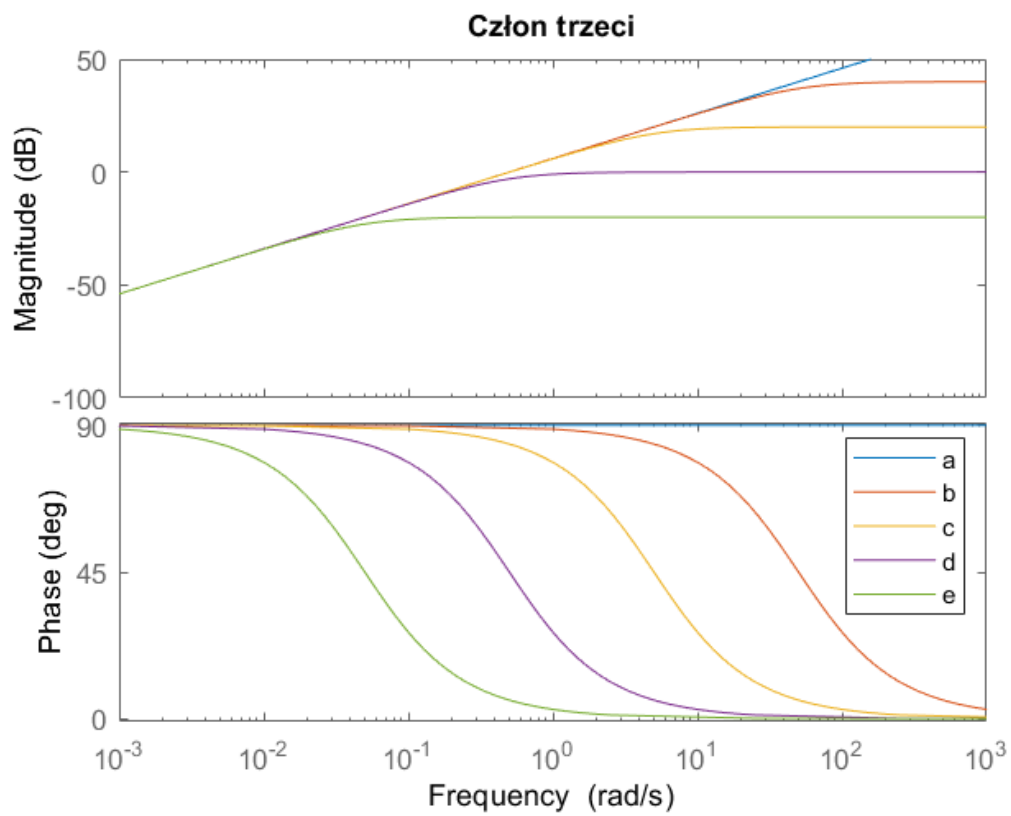
## 2.2 Charakterystyka amplitudowa oraz fazowa dla członu nr 2



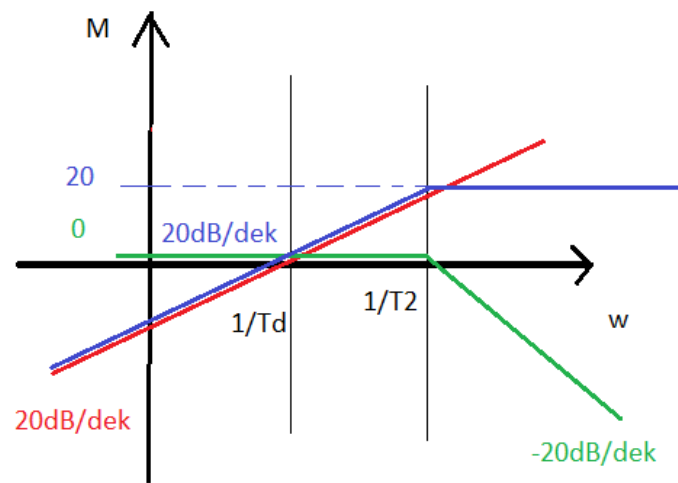
$$\frac{K}{T_i s(T_2 s + 1)}; K = 2; T_i = 2; T_2 = \frac{T_i}{10}; \frac{2}{2s((1/5)s + 1)} = \frac{1}{s((1/5)s + 1)}; \frac{1}{T_i} < \frac{1}{T_2}$$



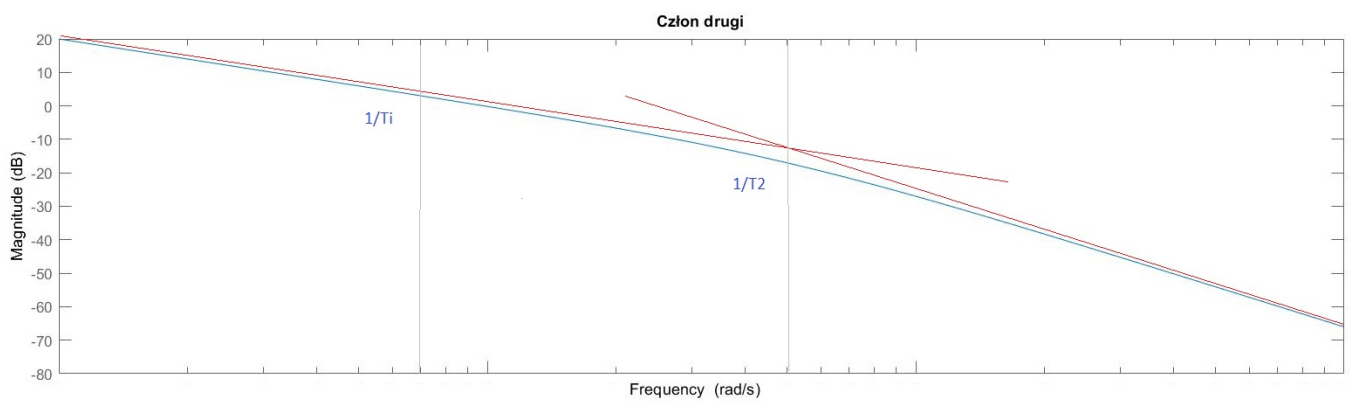
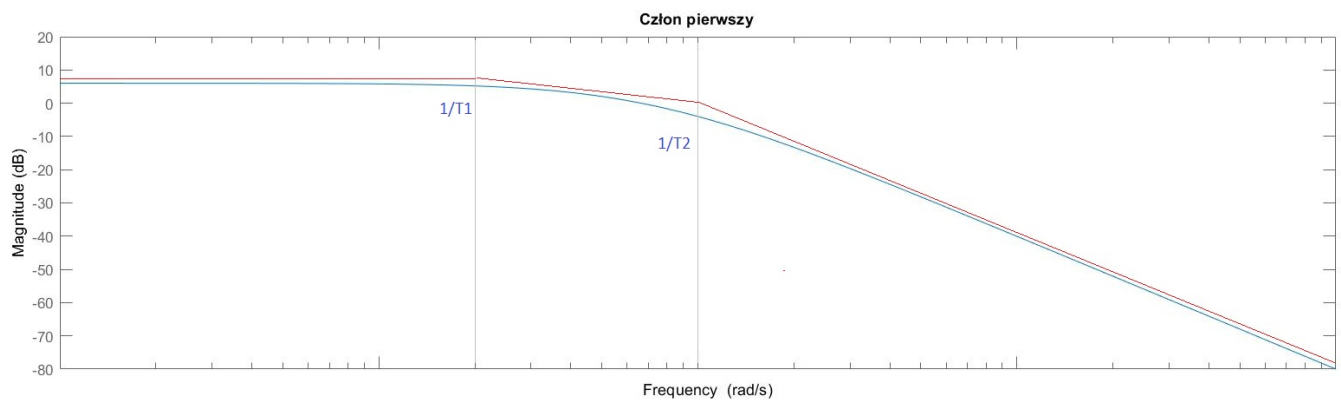
### 2.3 Charakterystyka amplitudowa oraz fazowa dla członu nr 3

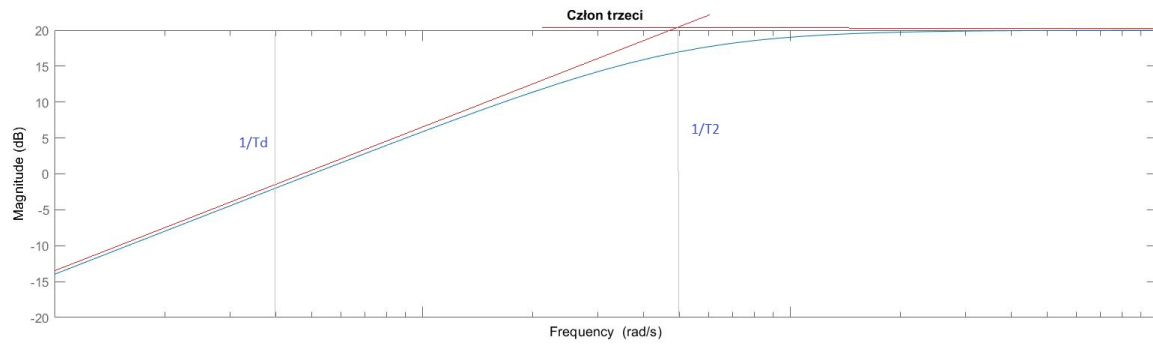


$$\frac{T_d s}{(T_2 s + 1)}; T_d = 2; T_2 = \frac{T_d}{10}; \frac{2s}{((1/5)s + 1)}; \frac{1}{T_d} < \frac{1}{T_2}$$



### 3 Asymptoty





## 4 Skrypt

```
clear all;
close all;

%parametry%
K=2;
T1=2;
T2=[0,T1/10,T1/2,T1];
Ti=[0,T1/100,T1/10,T1,10*T1];

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Odpowiedzi skokowe%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%1)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

s=tf('s');
M=(T1*s+1)*(T2*s+1);

k=size(M,2);
figure(1);
hold on, grid on;
for i=1:k
    G11=K/M(i);
```



```

step(G11);
end
title ('Człon pierwszy');
legend ('a','b','c','d');

```

```

%2)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
s=tf('s');
M=T1*s*(Ti*s+1);

k=size(M,2);
format=['r--','g ','b ','k ','m '];
figure(2);
hold on, grid on;
for i=1:k
G11=K/M(i);
[y,t]=step(G11);
plot(t,y(:,1,1),format(i,:))
end
title ('Człon drugi');
xlabel ('Amplitude');
ylabel ('Time(seconds)');
legend ('a','b','c','d','e');
axis([0 10 0 9]);

```

```

%3)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
s=tf('s');
M=(Ti*s+1);

k=size(M,2);
format=['r ','g ','b ','k ','m ','c '];
figure(3);
hold on, grid on;
for i=2:1:k-2
G11=(T1*s)/M(i);
[y,t]=step(G11);
plot(t,y(:,1,1),format(i))
end
title ('Człon trzeci 1');
legend ('a','b','c');

```

```

figure(4);
hold on, grid on;
for i=4:1:k
G11=T1*s/M(i);
[y,t]=step(G11);
plot(t,y(:,1,1),format(i))
end
title ('Człon trzeci 2');
legend ('d','e');

```

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Charakterystyki częstotliwościowe %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

```

%1)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
s=tf('s');
M=(T1*s+1)*(T2*s+1);

```

```

k=size(M,2);
figure(5);
hold on, grid on;
for i=1:k
G11=K/M(i);
bode(G11);
end
title ('Człon pierwszy');
legend ('a','b','c','d');

```

```

%2)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
s=tf('s');
M=T1*s*(Ti*s+1);

```

```

k=size(M,2);
figure(6);
hold on, grid on;
for i=1:k
G11=K/M(i);
bode(G11);

```

```
end
title ('Człon drugi');
legend ('a','b','c','d','e');
```

```
%3)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
s=tf('s');
M=(Ti*s+1);
```

```
k=size(M,2);
figure(7);
hold on, grid on;
for i=1:k
G11=T1*s/M(i);
bode(G11);
end
title ('Człon trzeci');
legend ('a','b','c','d','e');
```