



Podstawy robotyki z kinematyką

Modelowanie i symulacja serwomechanizmu liniowego i nieliniowego

Automatyka i robotyka

Paweł Żuczek, Mateusz Wójcik, Inez Wałaszek

gr.10, zespół E

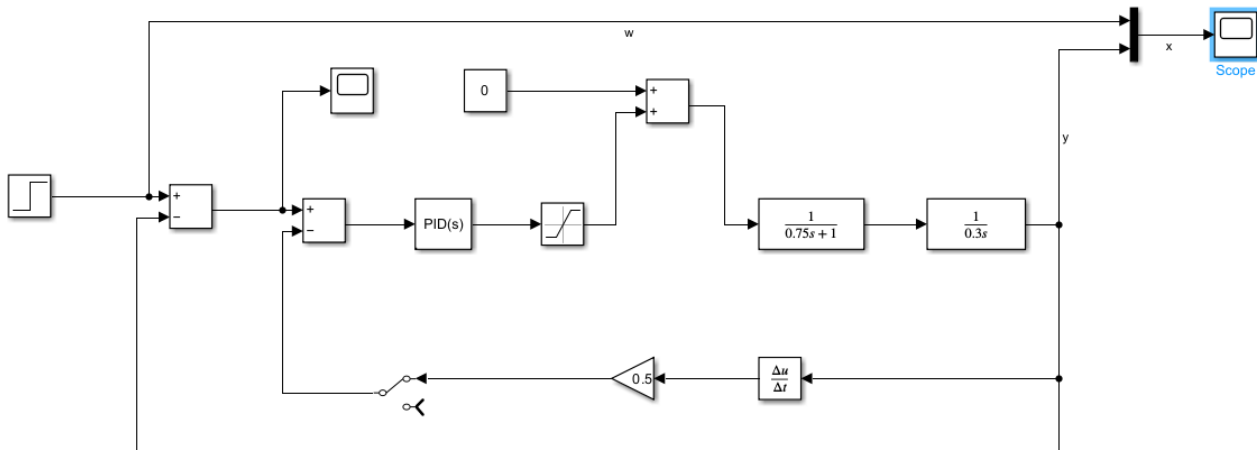
Kraków, 19.03.2025

Wprowadzenie

siema siema

Serwomechanizm liniowy

W pierwszym etapie przeprowadzenia laboratorium, zamodelowano w środowisku Simulink, model



Pierwszy zestaw nastaw

Block Parameters: PID Controller

PID 1dof (mask) (link)

This block implements continuous- and discrete-time PID control algorithms and includes advanced features such as anti-windup, external reset, and signal tracking. You can tune the PID gains automatically using the 'Tune...' button (requires Simulink Control Design).

Controller: PID Form: Parallel

Time domain:

☒ Continuous-time

☐ Discrete-time

Discrete-time settings

Sample time (-1 for inherited): -1

Compensator formula

$$P + I \frac{1}{s} + D \frac{N}{1 + N \frac{1}{s}}$$

Main Initialization Saturation Data Types State Attributes

Controller parameters

Source: internal

Proportional (P): 0.237224537297982

Integral (I): 0.0288956423710078 ☐ Use I*Ts (optimal for codegen)

Derivative (D): 0.13264519131246

Filter coefficient (N): 81.9572363684986 ☒ Use filtered derivative

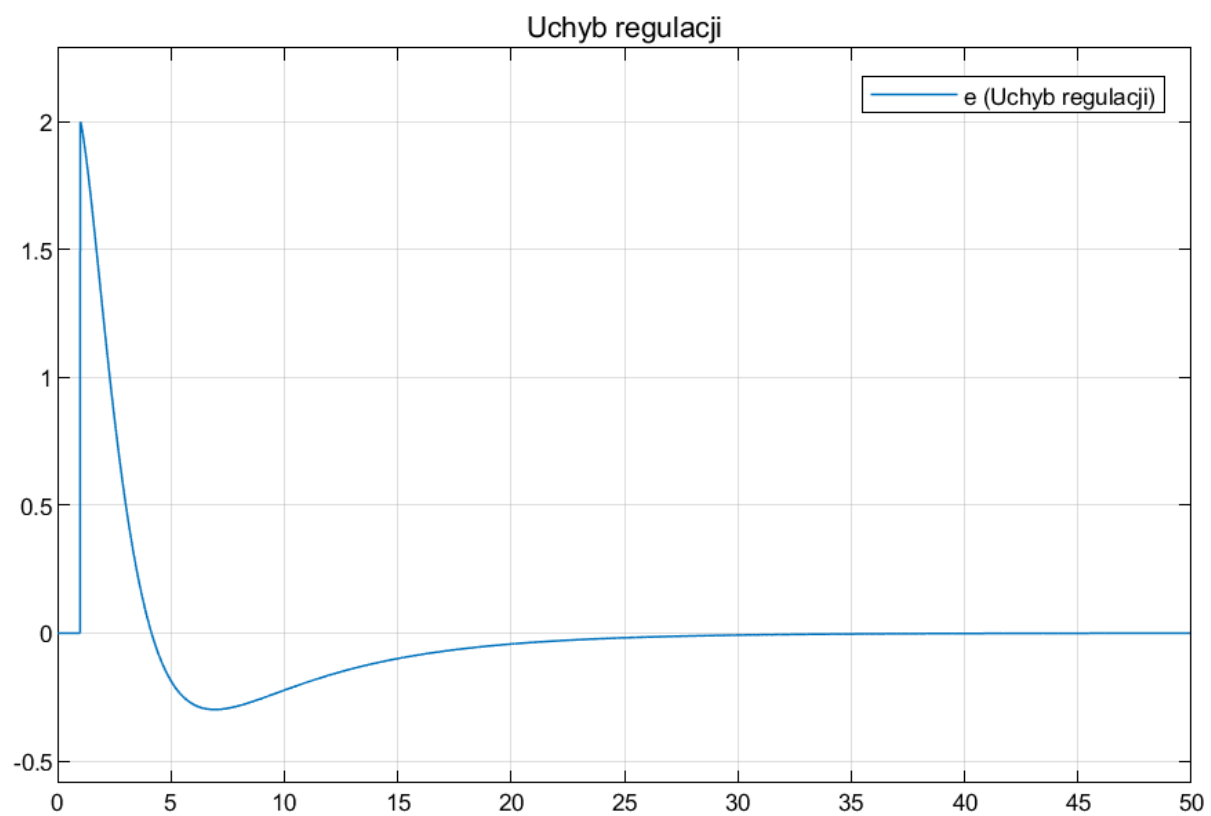
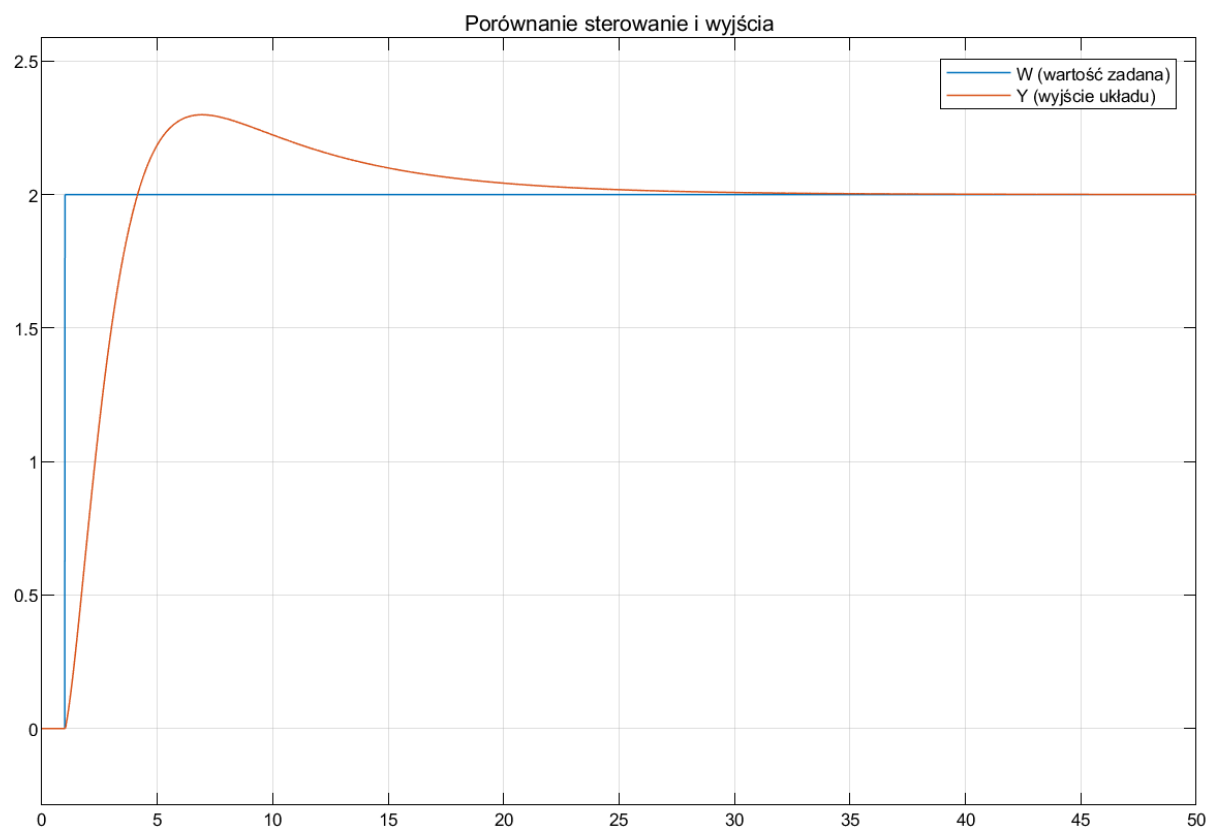
Automated tuning

Select tuning method: Transfer Function Based (PID Tuner App) Tune...

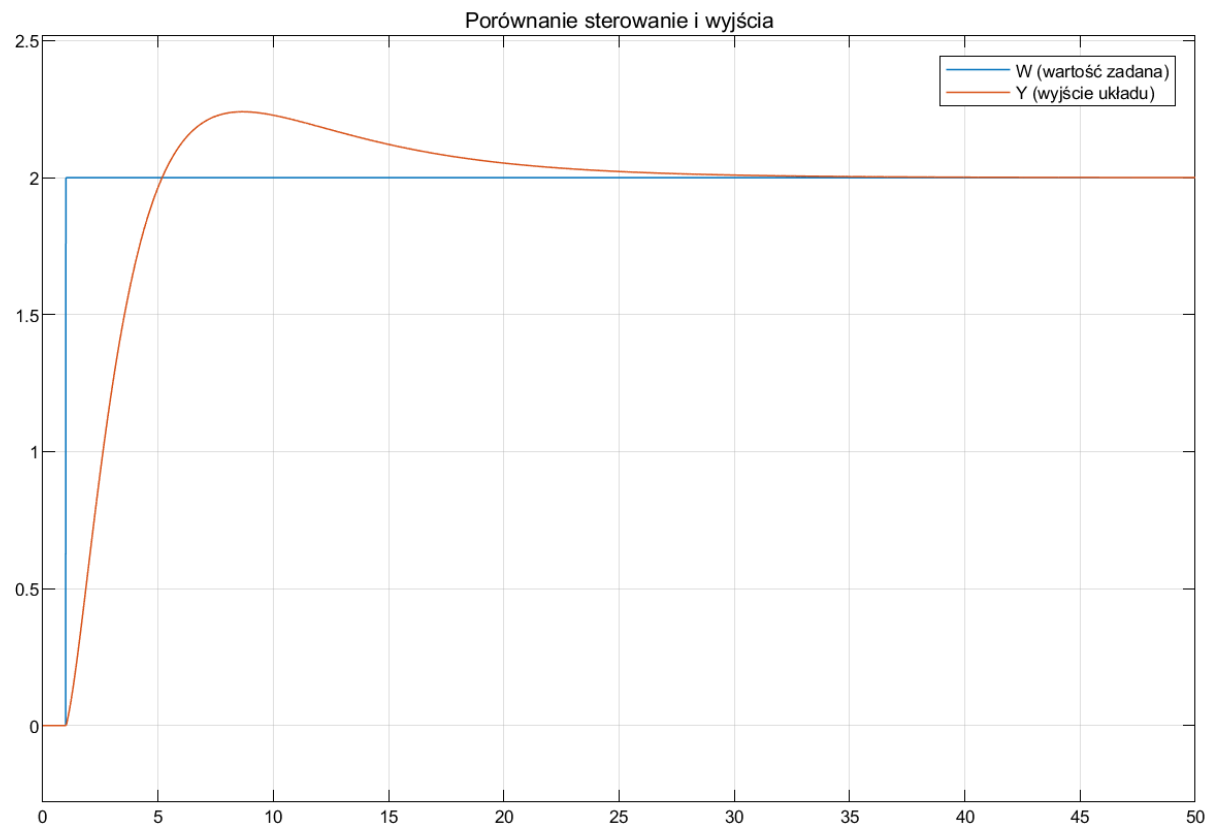
☒ Enable zero-crossing detection

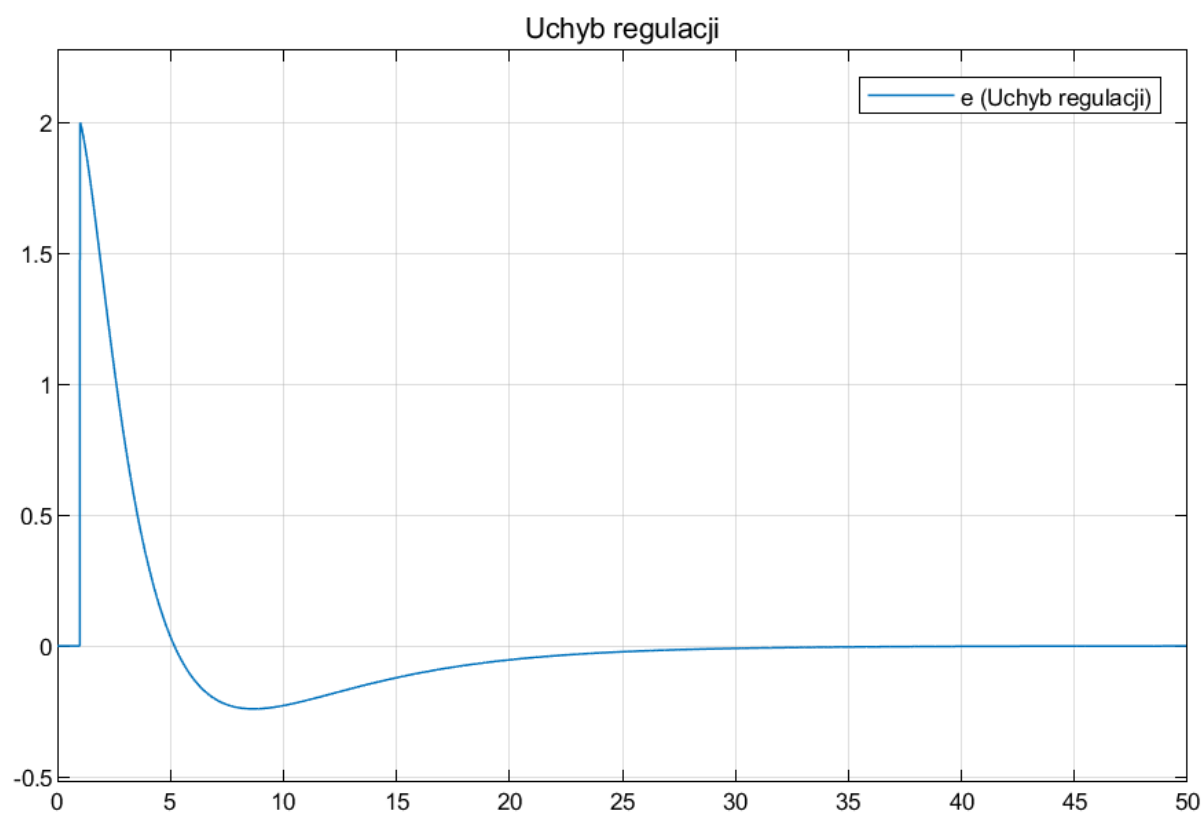
OK Cancel Help Apply

Z otwartą pętlą sprzężenia tachometrycznego



Z zamkniętą pętlą sprzężenia tachometrycznego





Drugi zestaw nastaw

Block Parameters: PID Controller

PID 1dof (mask) (link)

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Controller: PID Form: Parallel

Time domain:

☒ Continuous-time

☐ Discrete-time

Discrete-time settings

Sample time (-1 for inherited): -1

Compensator formula

$$P + I \frac{1}{s} + D \frac{N}{1 + N \frac{1}{s}}$$

Main Initialization Saturation Data Types State Attributes

Controller parameters

Source: internal

Proportional (P): 1

Integral (I): 0 ☐ Use I*Ts (optimal for codegen)

Derivative (D): 0 ☐ Use filtered derivative

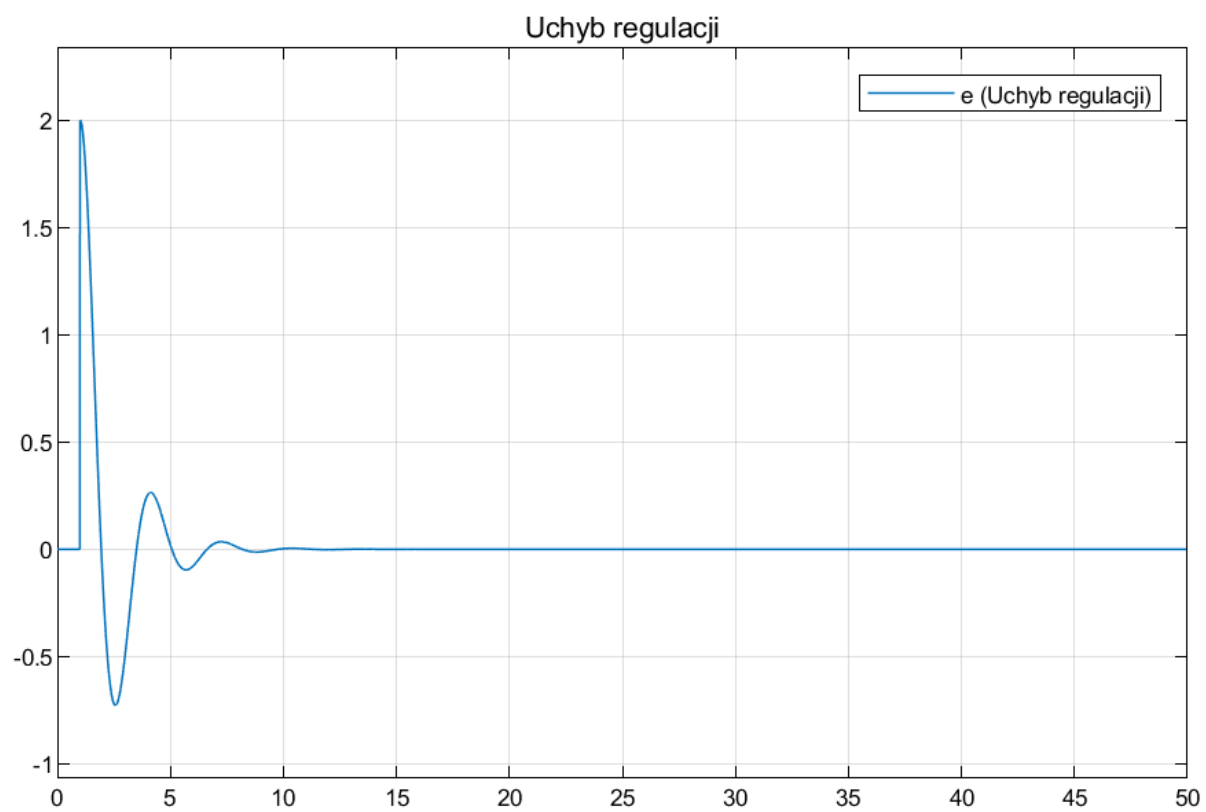
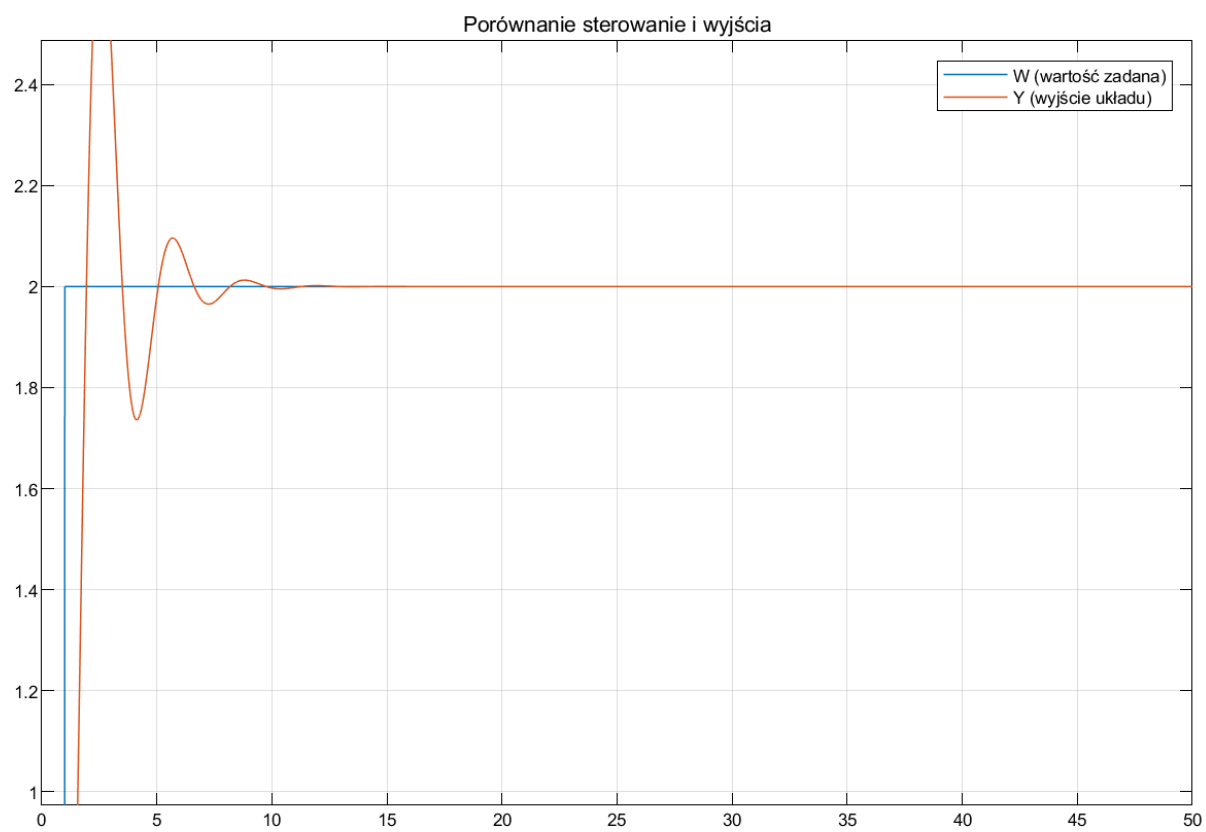
Filter coefficient (N): 100 ☒ Use filtered derivative

Automated tuning

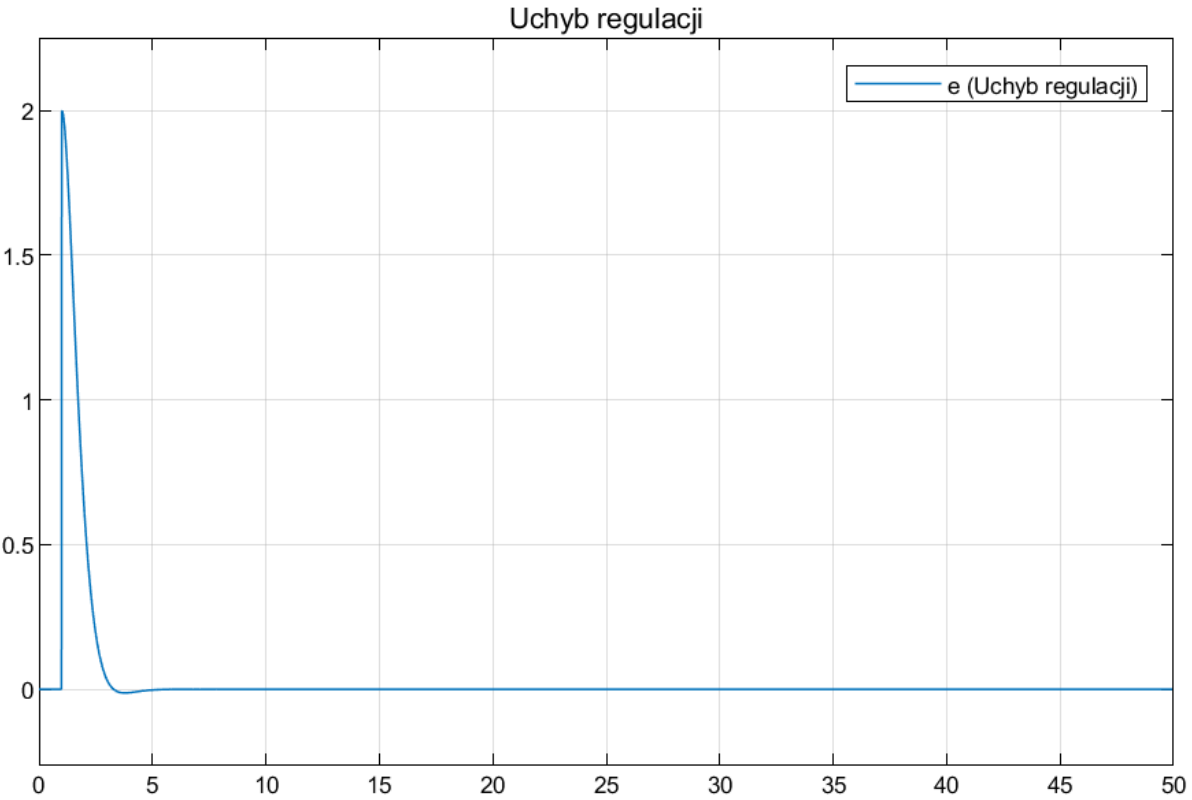
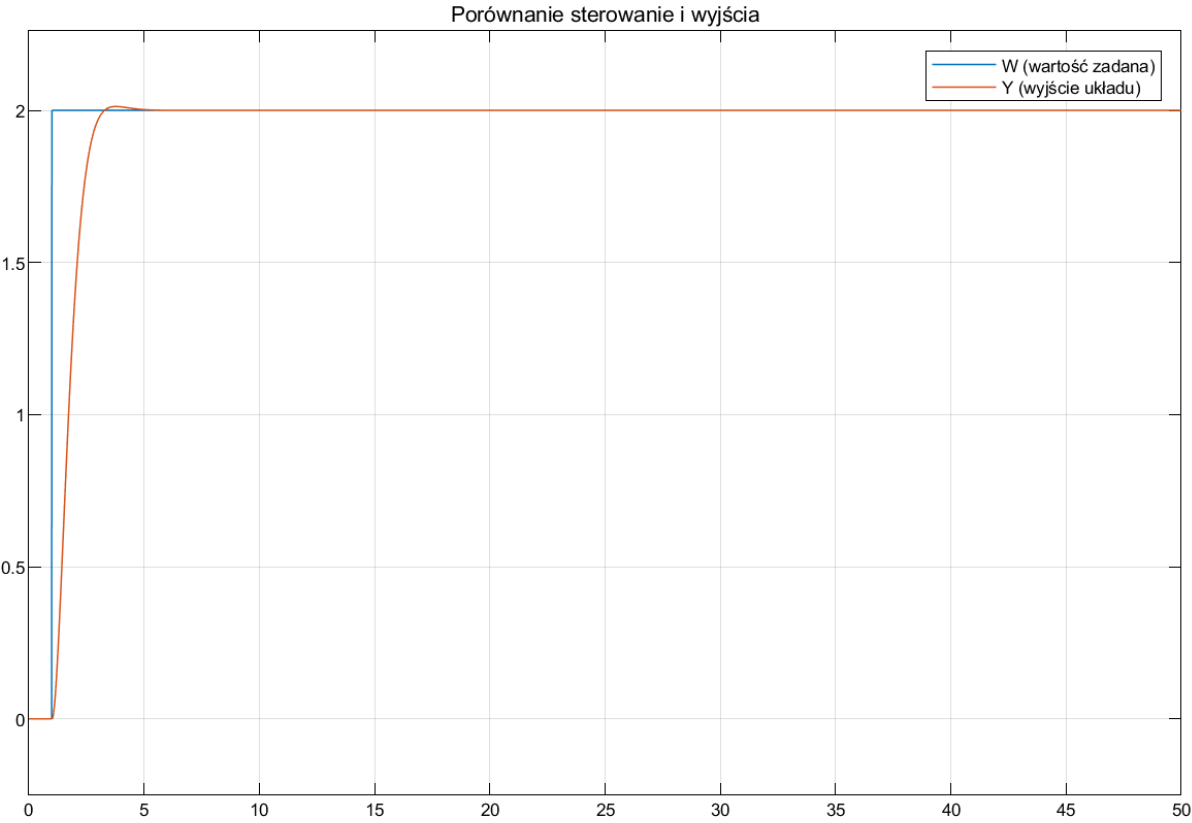
Select tuning method: Transfer Function Based (PID Tuner App)

☒ Enable zero-crossing detection

Z otwartą pętlą sprzężenia tachometrycznego



Z zamkniętą pętlą sprzężenia tachometrycznego



Trzeci zestaw nastaw

Block Parameters: PID Controller

PID 1dof (mask) (link)

This block implements continuous- and discrete-time PID control algorithms and includes advanced features such as anti-windup, external reset, and signal tracking. You can tune the PID gains automatically using the 'Tune...' button (requires Simulink Control Design).

Controller: PID Form: Parallel

Time domain:

☒ Continuous-time

☐ Discrete-time

Discrete-time settings

Sample time (-1 for inherited): -1

Compensator formula

$$P + I \frac{1}{s} + D \frac{N}{1 + N \frac{1}{s}}$$

Main Initialization Saturation Data Types State Attributes

Controller parameters

Source: internal

Proportional (P): 1

Integral (I): 0.5 ☐ Use I*Ts (optimal for codegen)

Derivative (D): 0

Filter coefficient (N): 100 ☒ Use filtered derivative

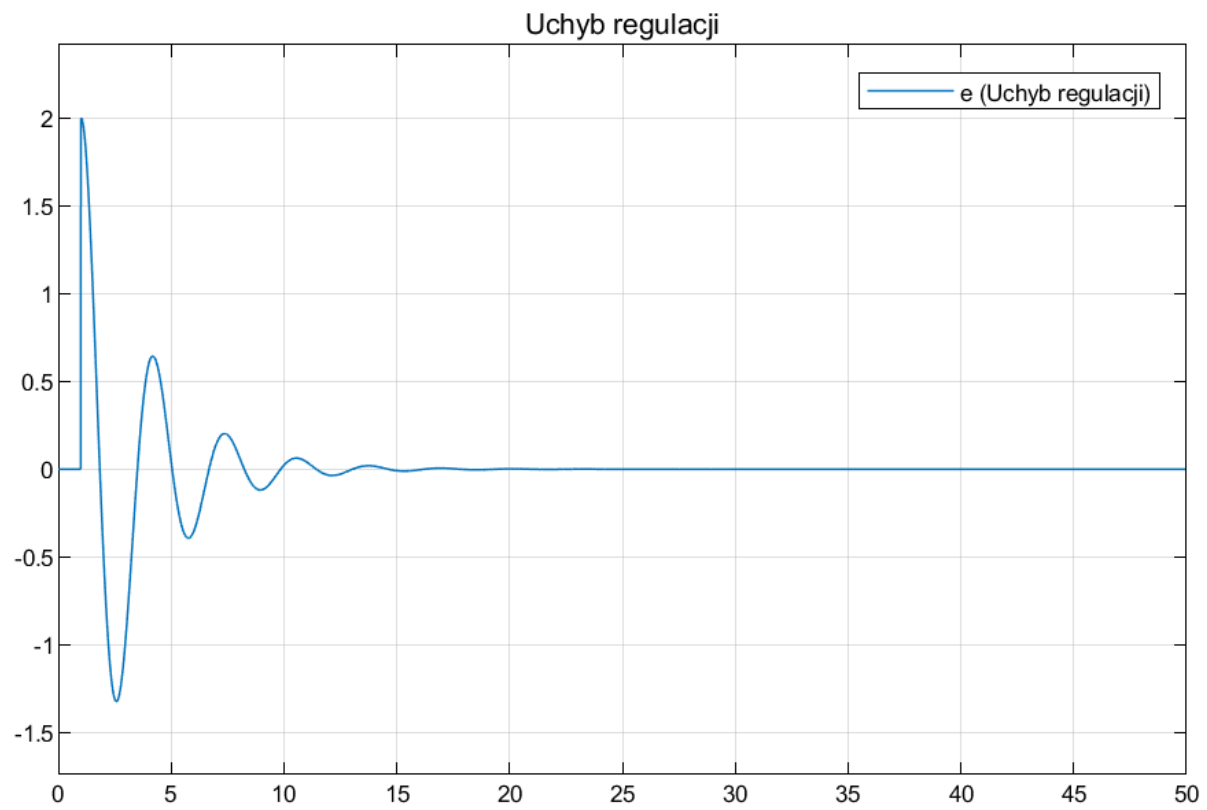
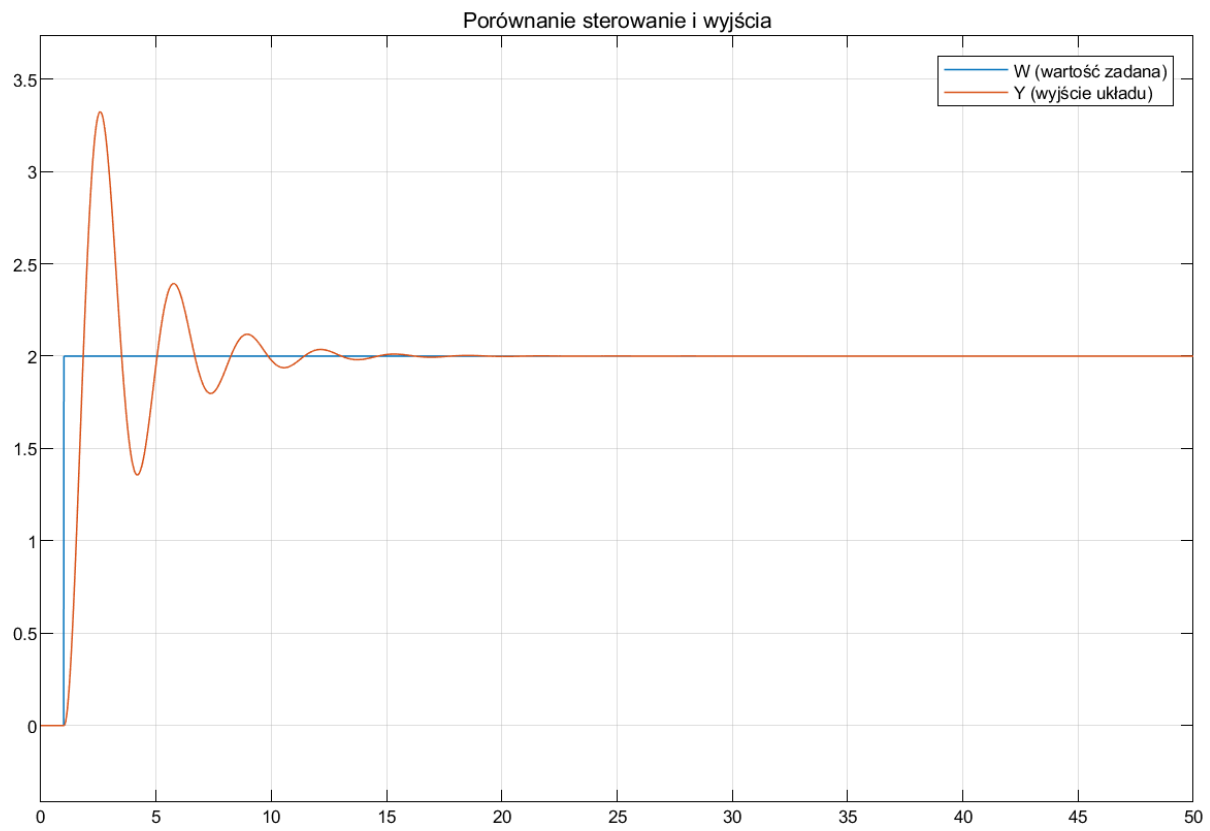
Automated tuning

Select tuning method: Transfer Function Based (PID Tuner App) Tune...

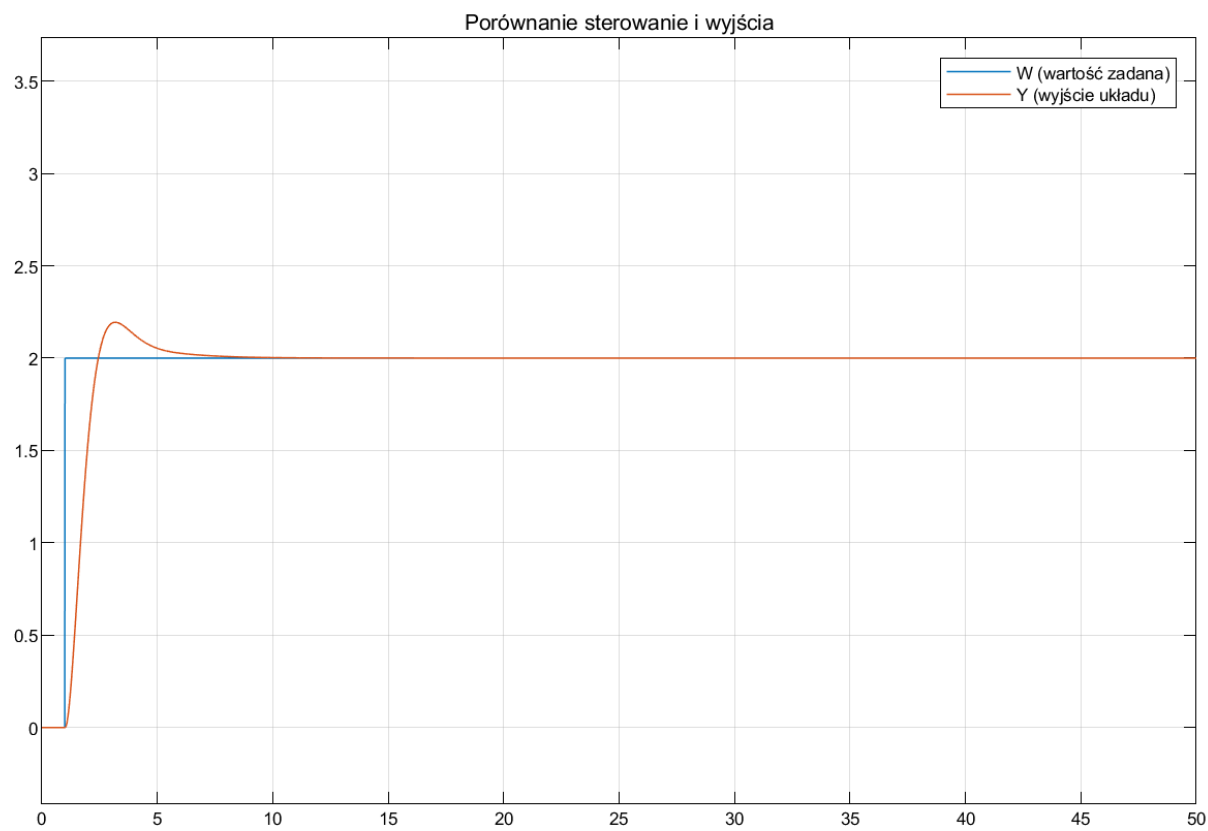
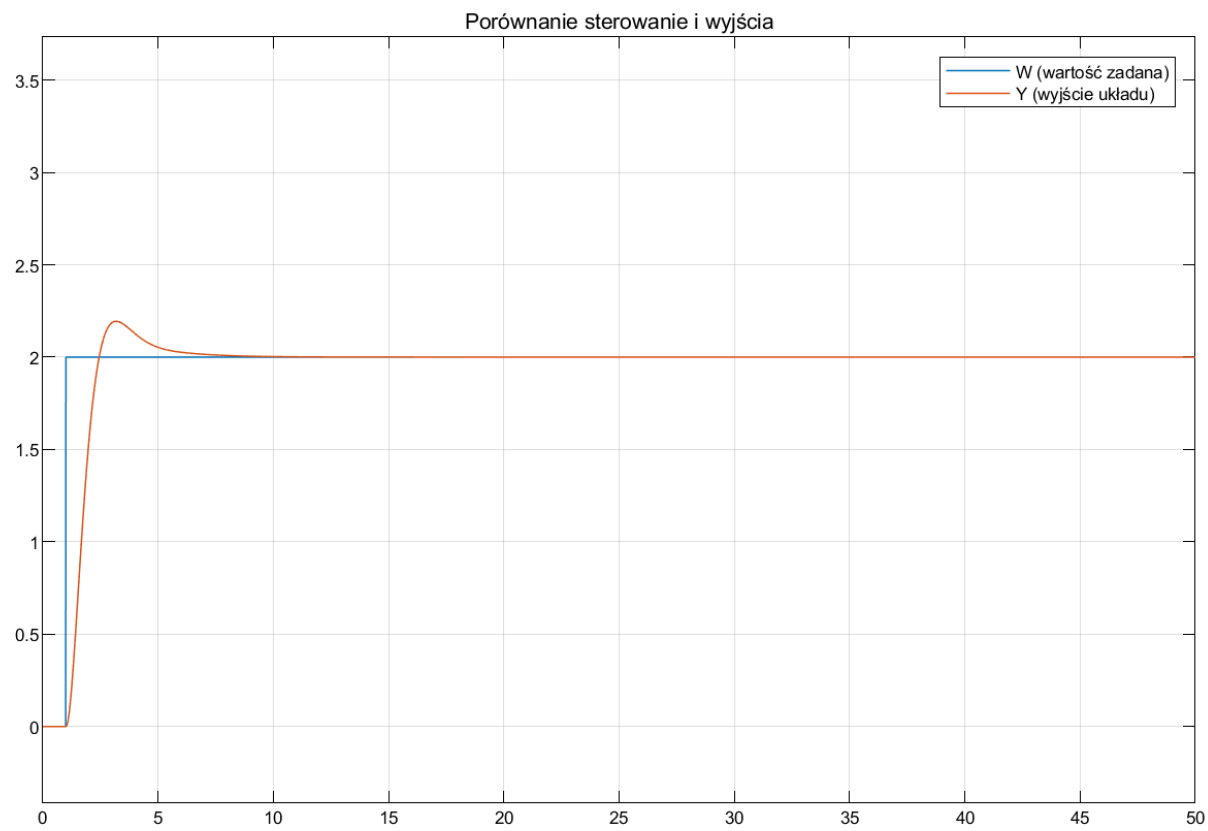
☒ Enable zero-crossing detection

OK Cancel Help Apply

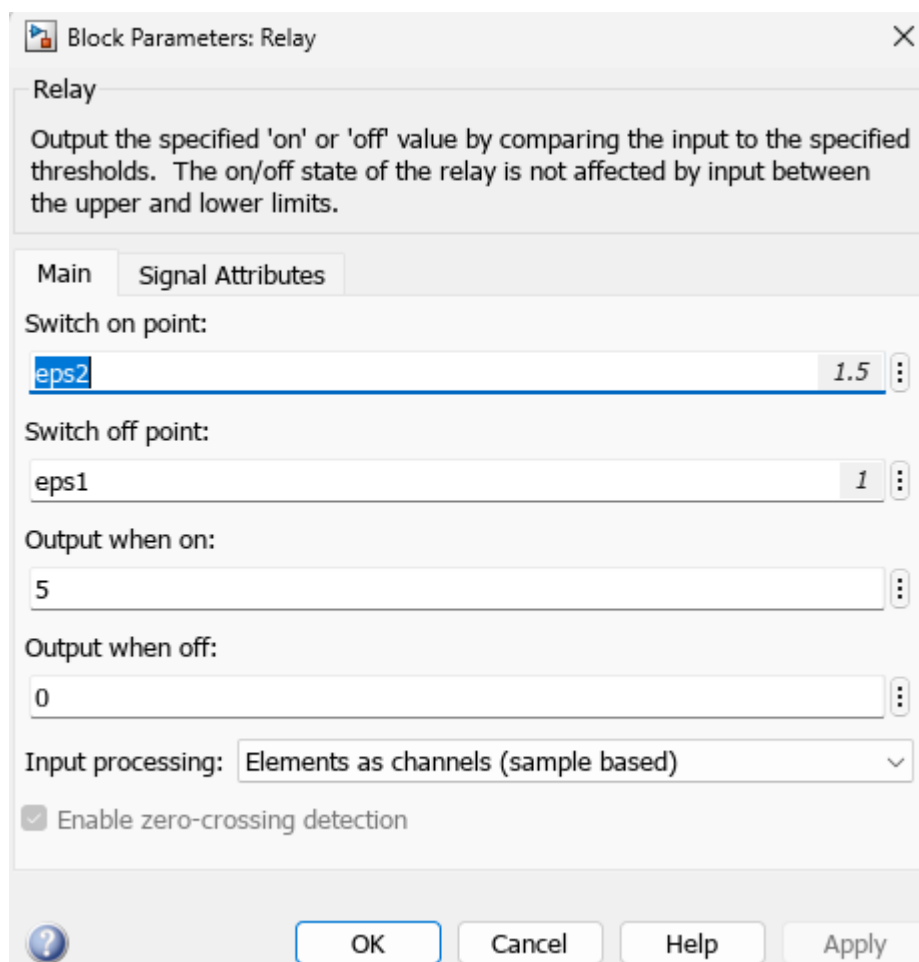
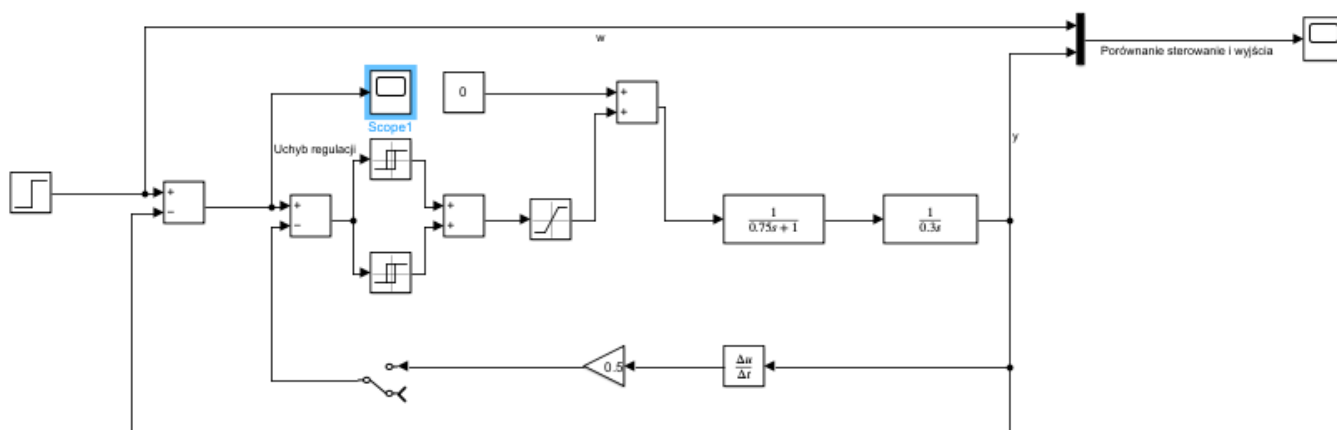
Z otwartą pętlą sprzężenia tachometrycznego



Z zamkniętą pętlą sprzężenia tachometrycznego



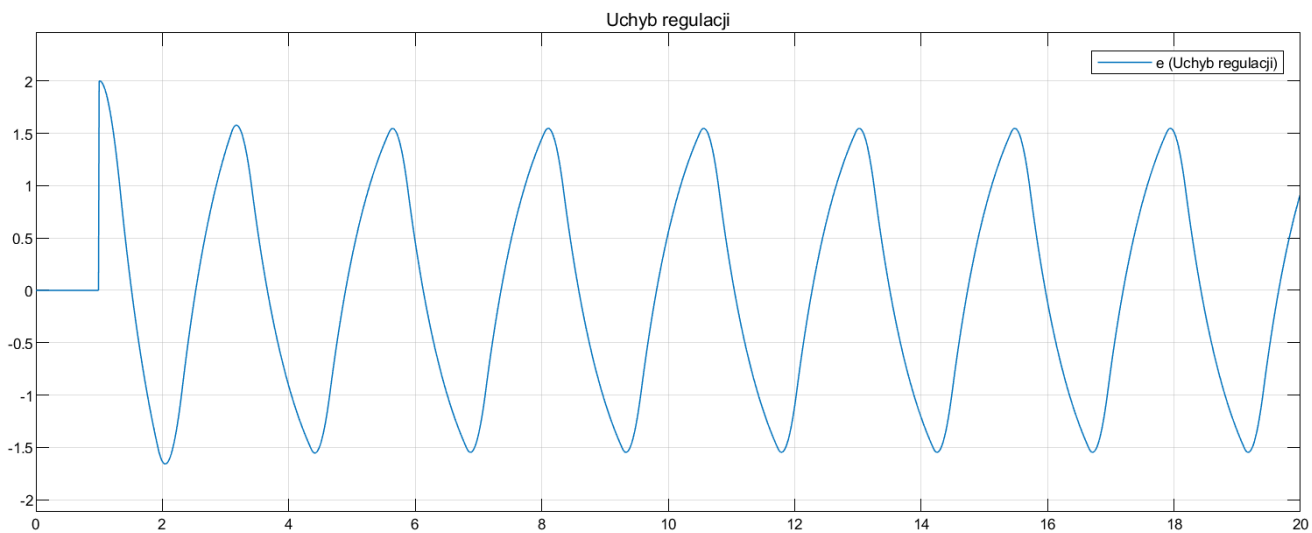
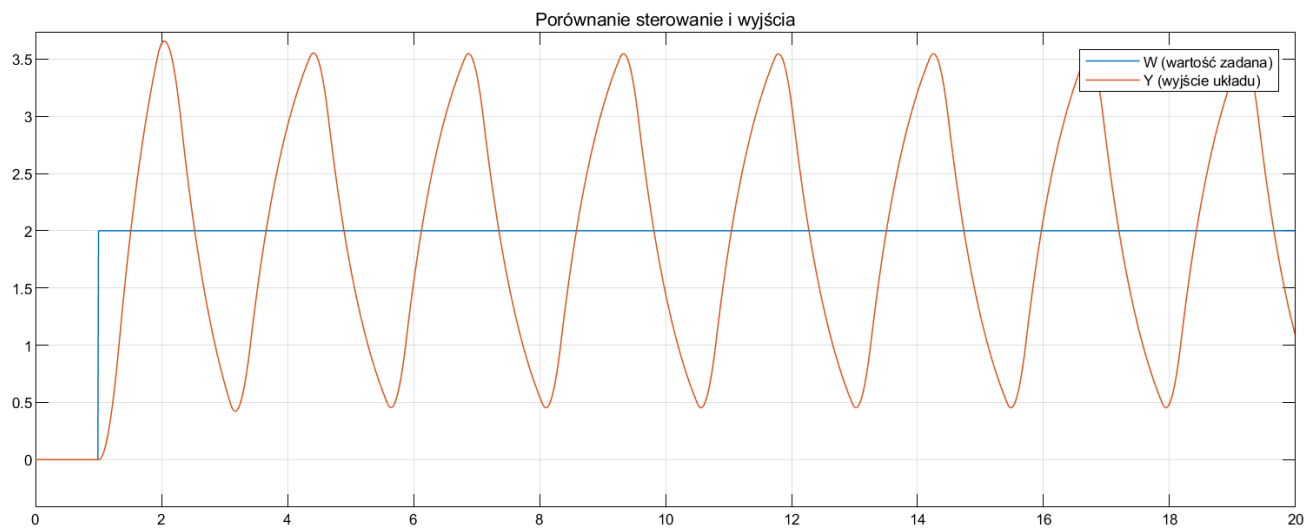
Serwomechanizm nieliniowy



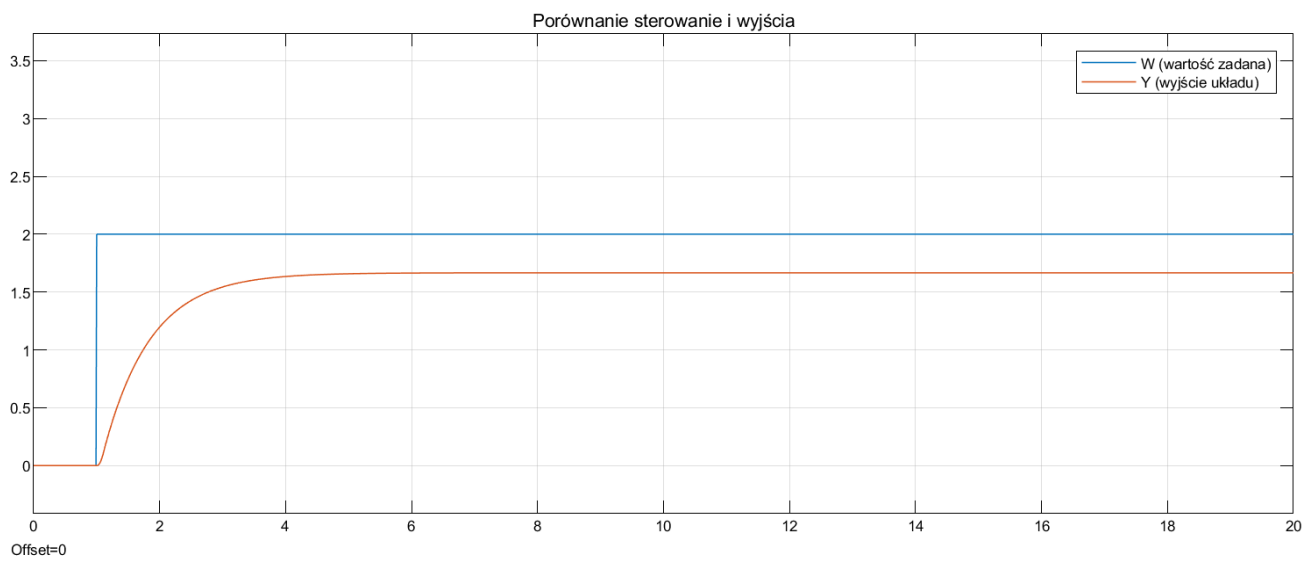
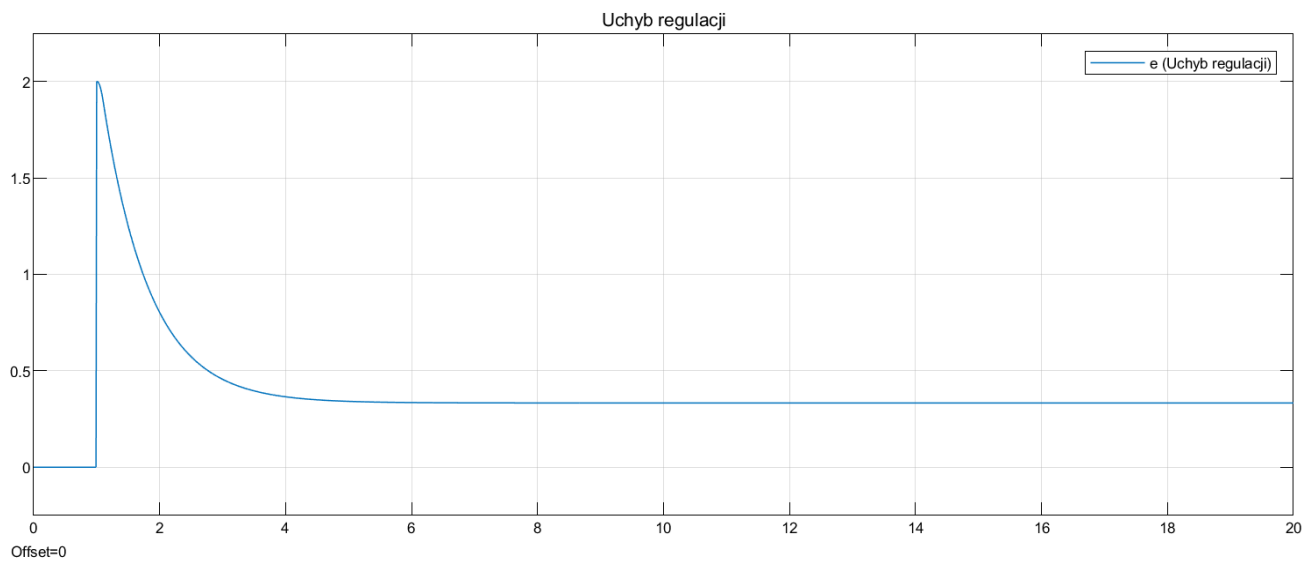
Pierwszy zestaw nastaw

```
eps1 = 1 ;  
eps2 = 1.5;
```

Z otwartą pętlą sprzężenia tachometrycznego



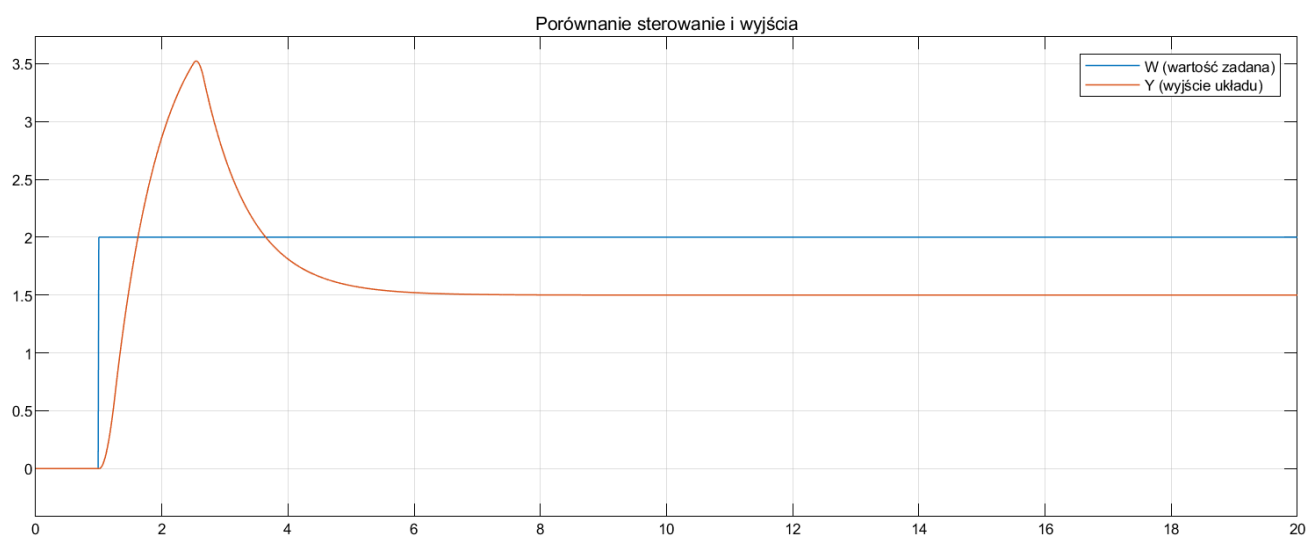
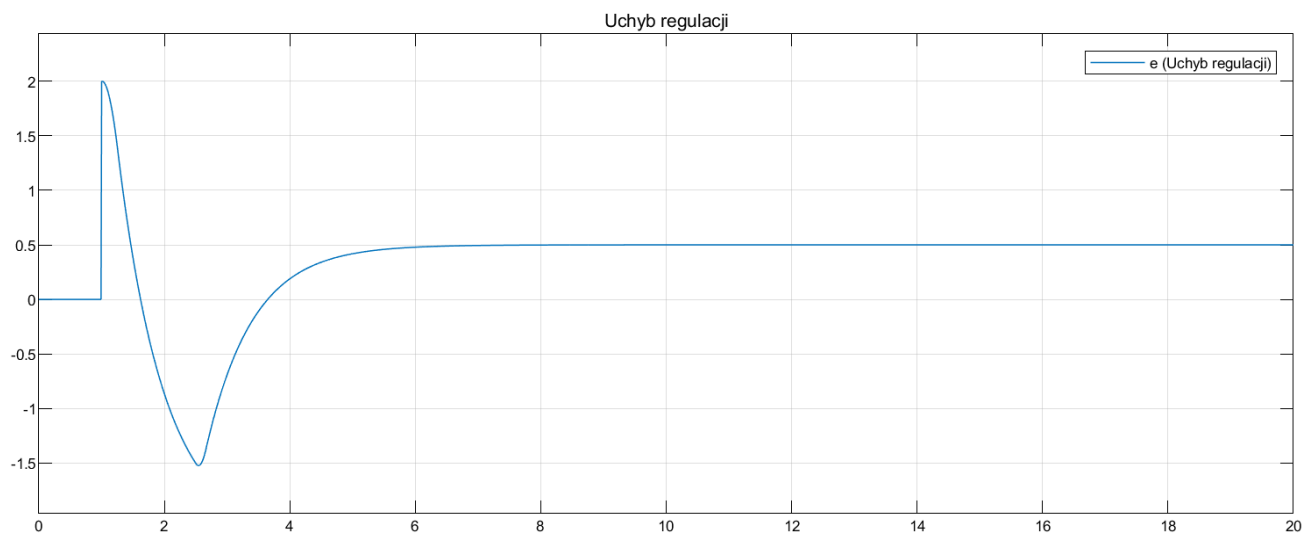
Z zamkniętą pętlą sprzężenia tachometrycznego



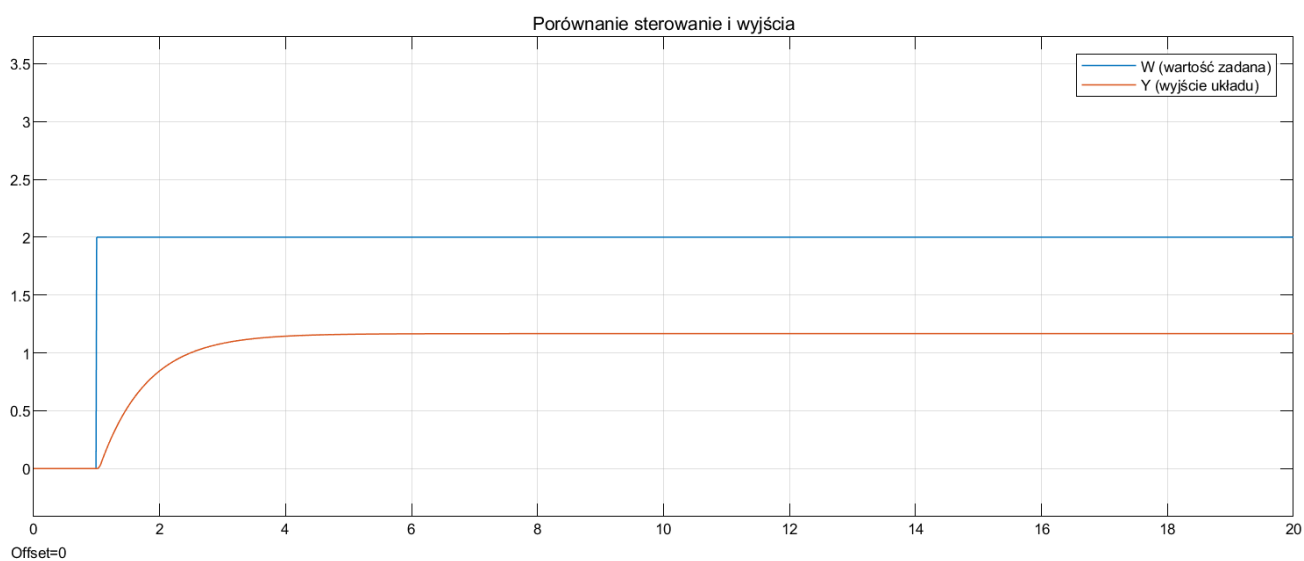
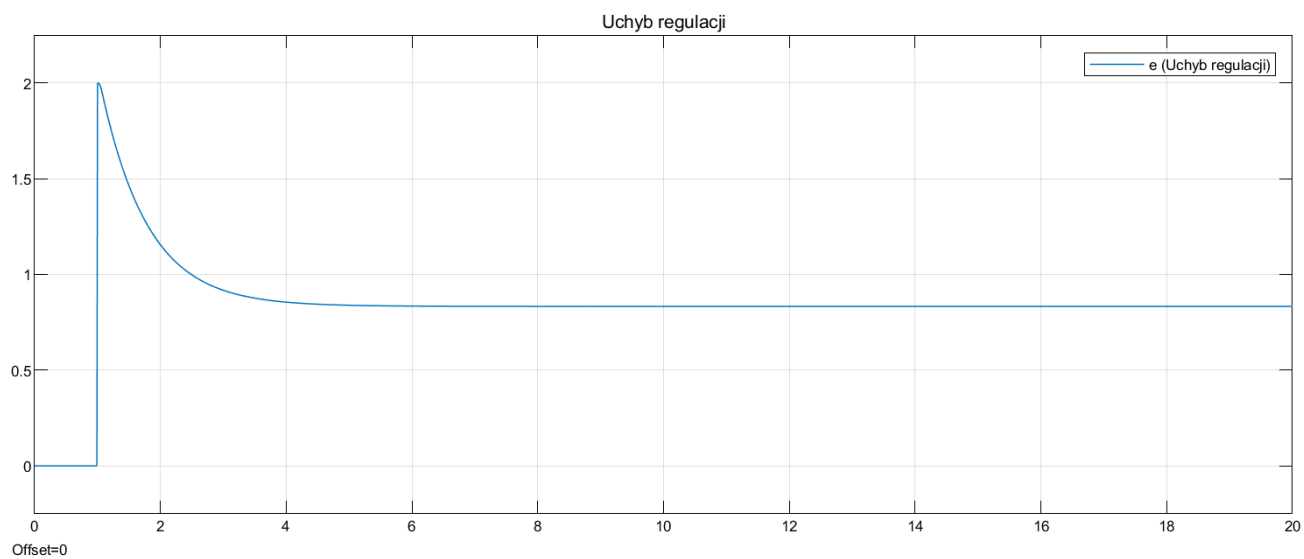
Drugi zestaw nastaw

```
eps1 = 1.4;  
eps2 = 1.5;
```

Z otwartą pętlą sprzężenia tachometrycznego



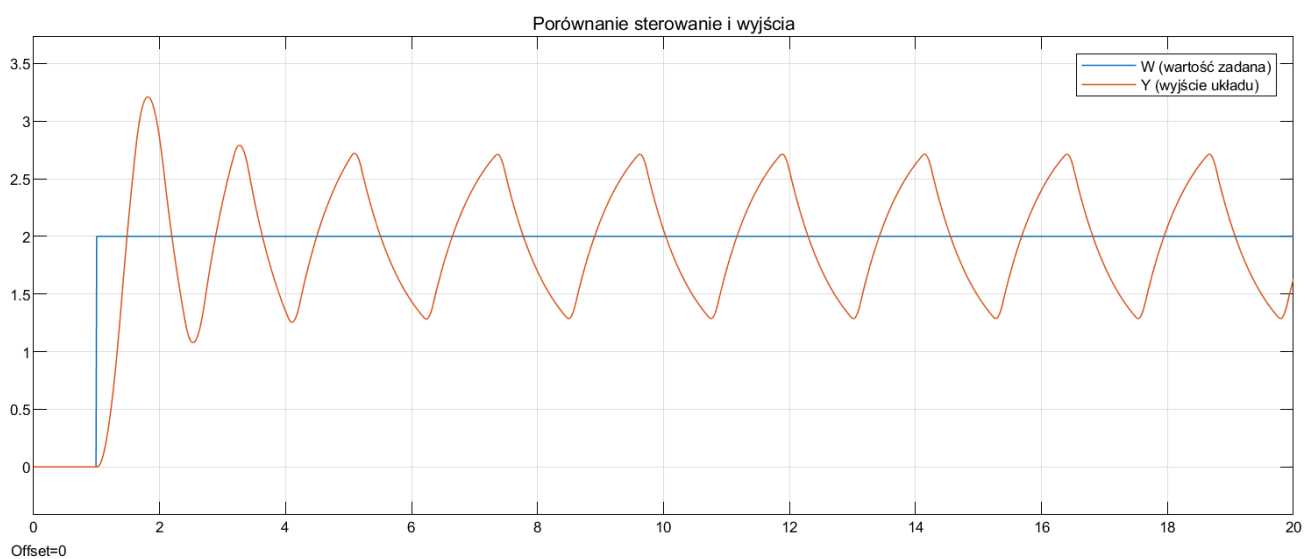
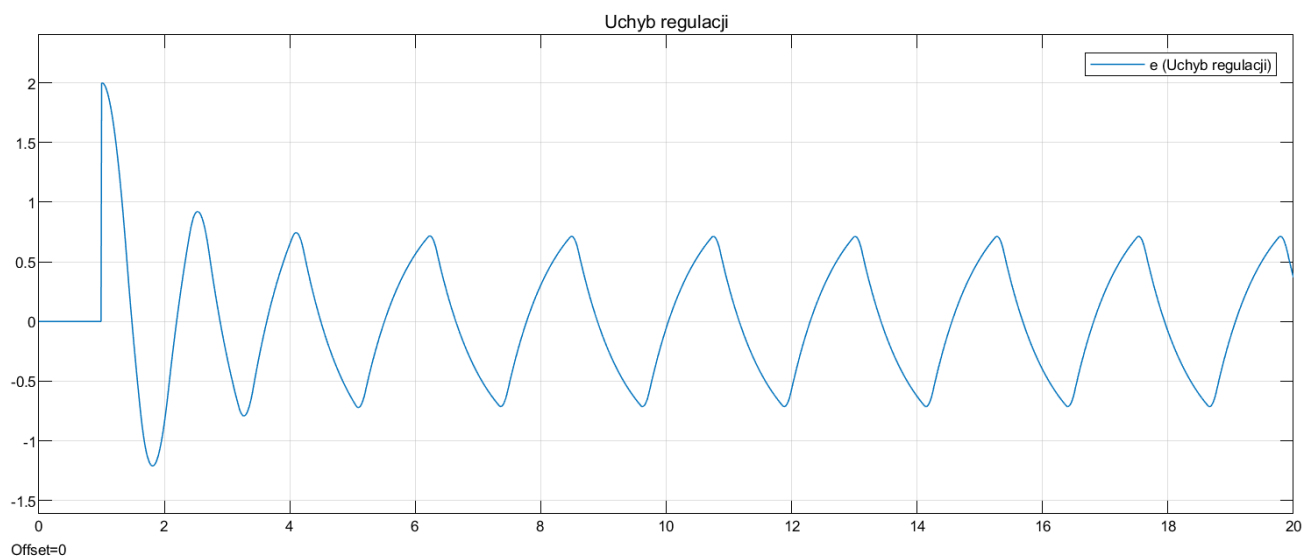
Z zamkniętą pętlą sprzężenia tachometrycznego



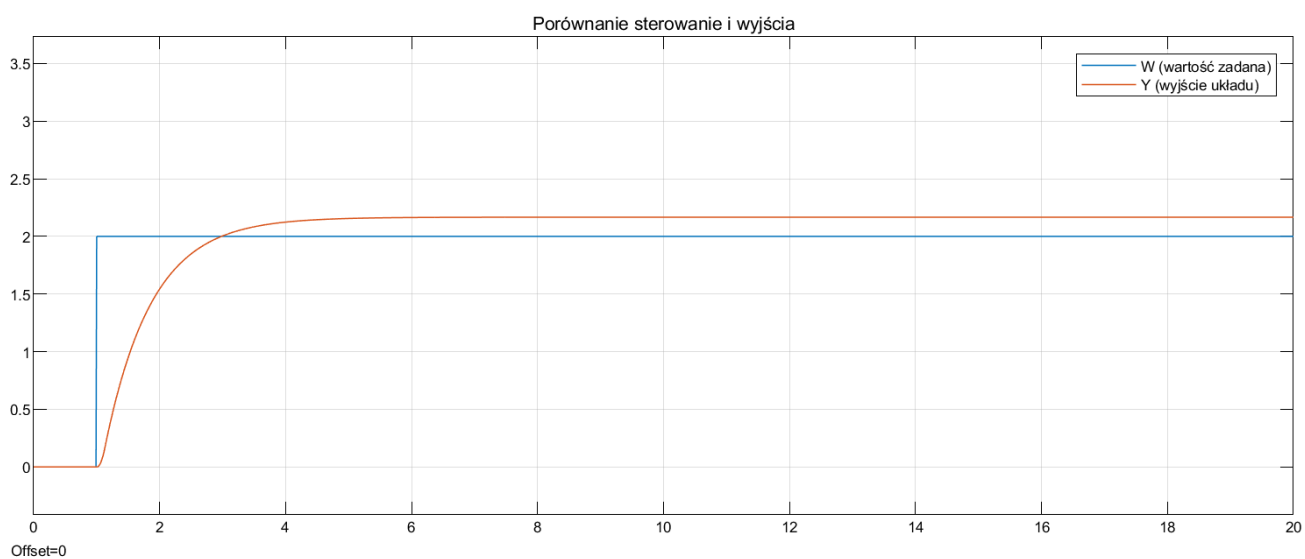
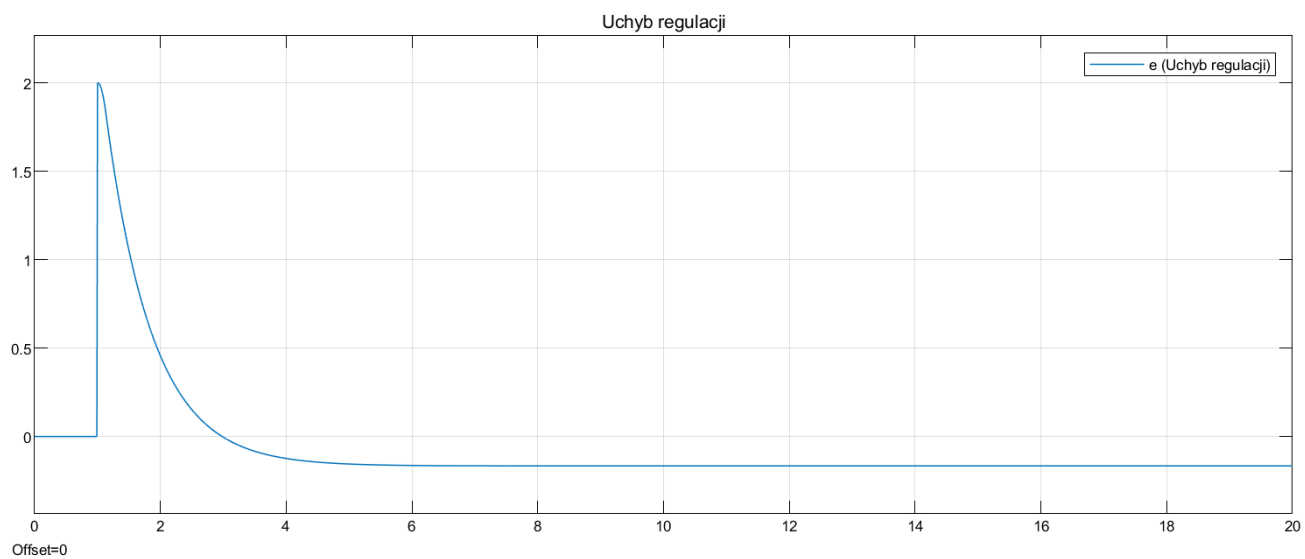
Trzeci zestaw nastaw

```
eps1 = 0.6;
eps2 = 0.7;
```

Z otwartą pętlą sprzężenia tachometrycznego



Z zamkniętą pętlą sprzężenia tachometrycznego



aktywnosc dodatkowa paweł żuczekl robi asymetryczne nastawy, bo ma duzo czasu pozdrawiam serdecznie