Pilotage d’un servo-moteur
Régulation de la vitesse

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Sommaire

Logiciels/Outils

- MATLAB-SIMULINK
- Cable USB 2.0
- Disque
- Quanser Qube-Servo 2

Objectifs

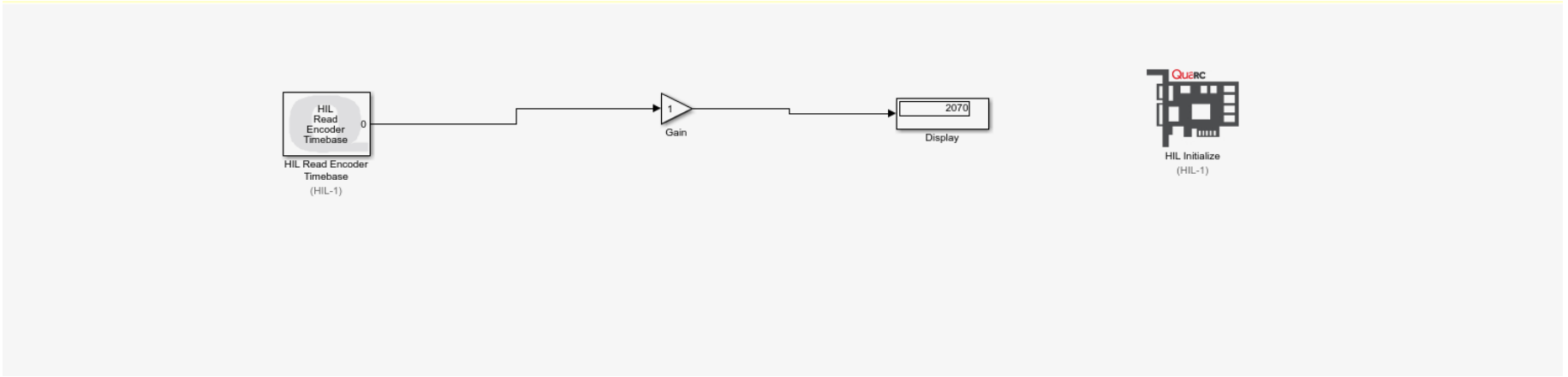
- Assurer la régulation de la vitesse de rotation du disque : -Régulation
  -Dépassement
  -Rapidité

Commandes et fonctions

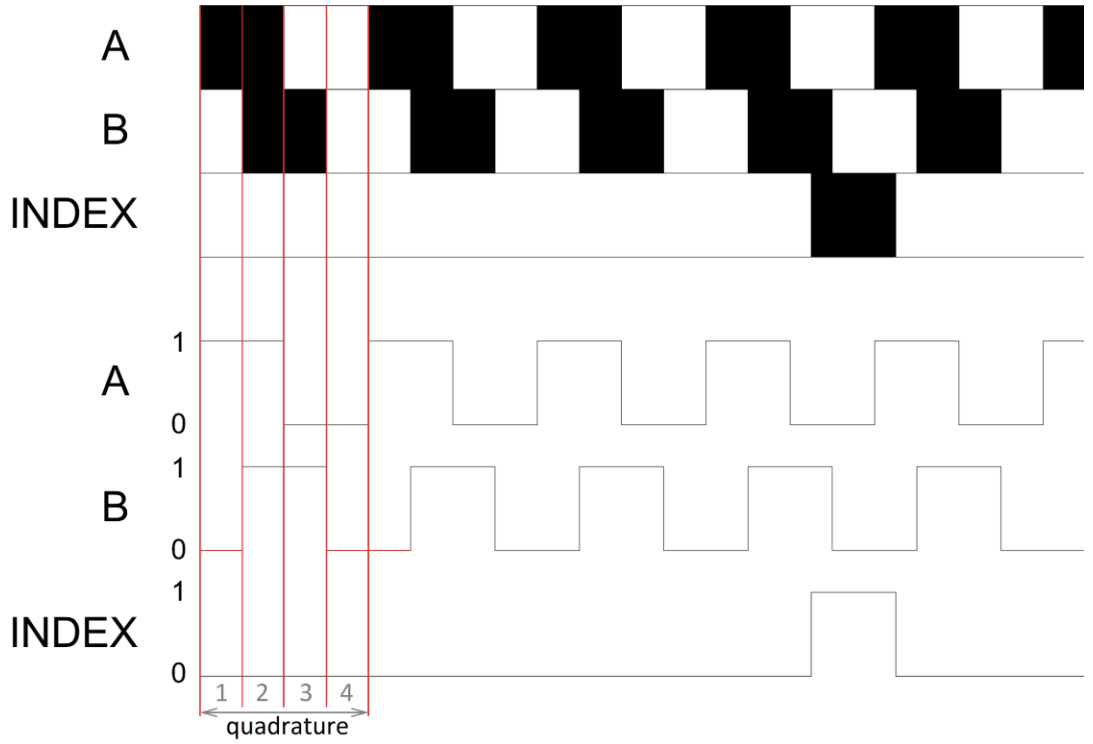
HIL Initialize
HIL Write Analog
HIL Read Encoder
Gain
Derivée
Filtre

Prise en main maquette

Un tour =2pi=2070 impulsions



QUBE


A
B
INDEX
1
A
0
1
B
0
1
INDEX
0
1 2 3 4
quadrature

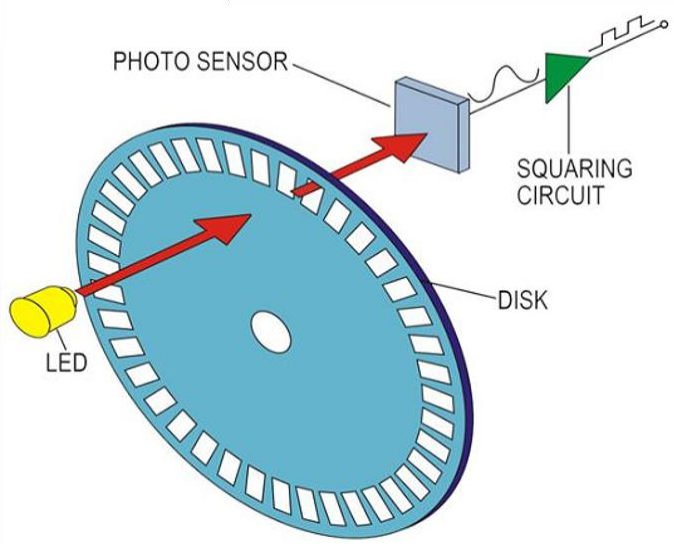
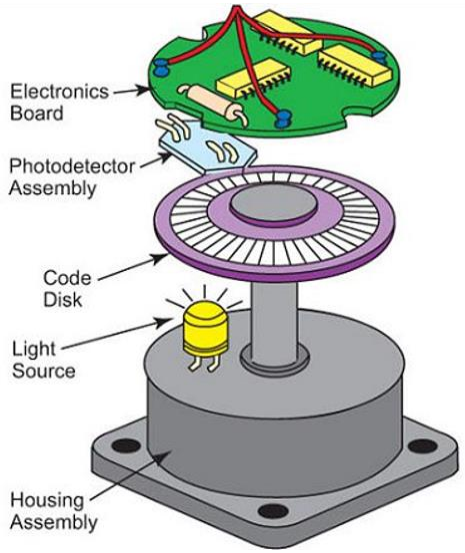
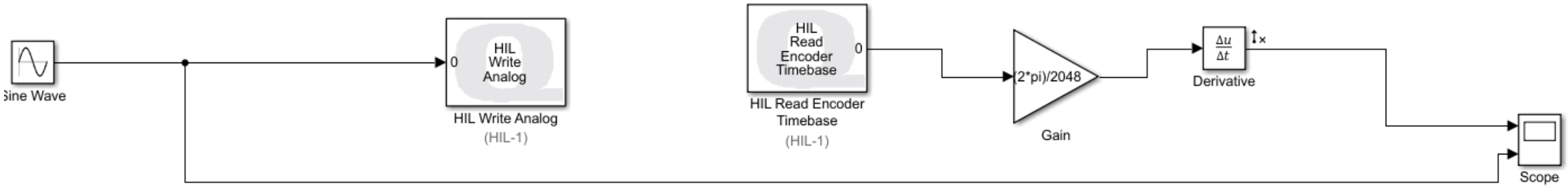


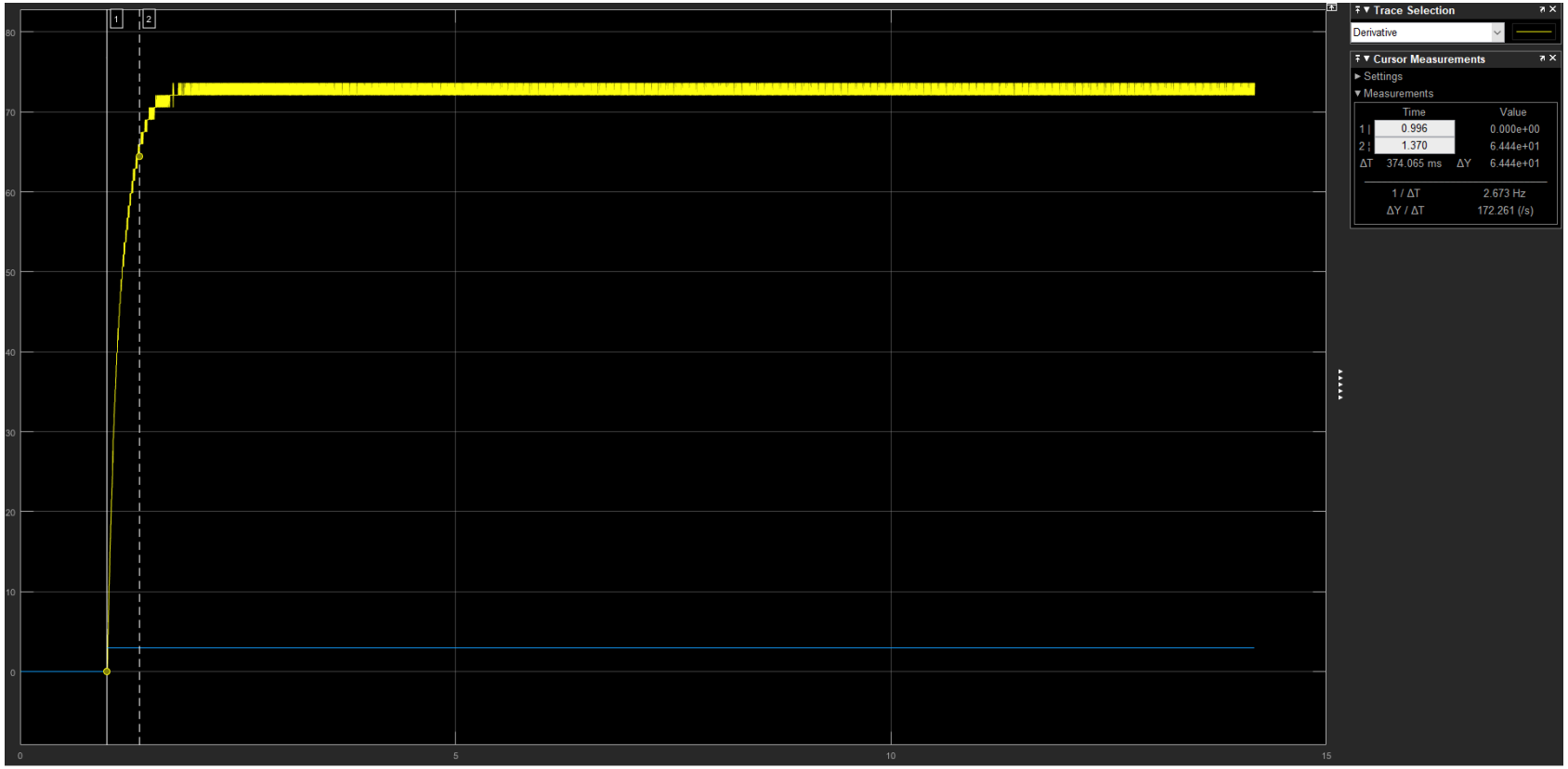
PHOTO SENSOR
SQUARING CIRCUIT
DISK
LED


Electronics Board
Photodetector Assembly
Code Disk
Light Source
Housing Assembly

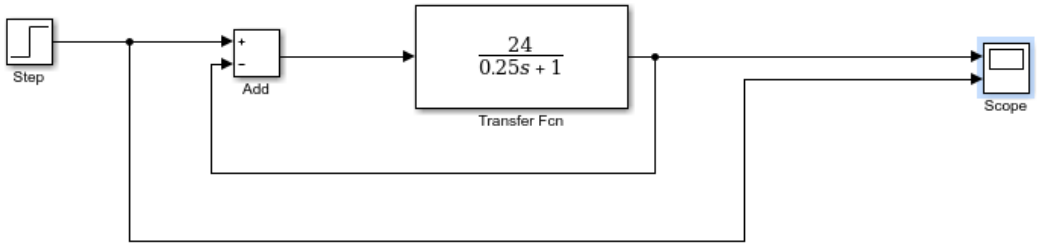


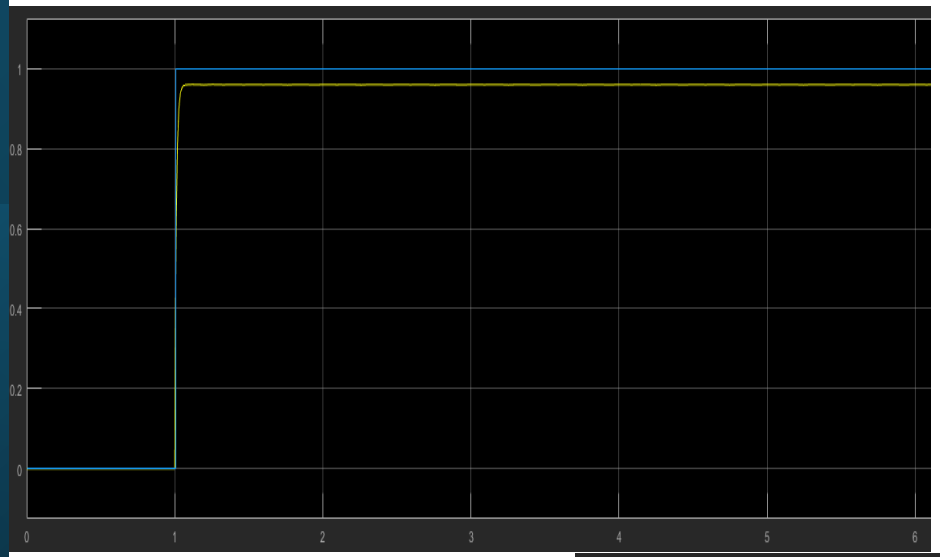
Conversion de l’angle en vitesse

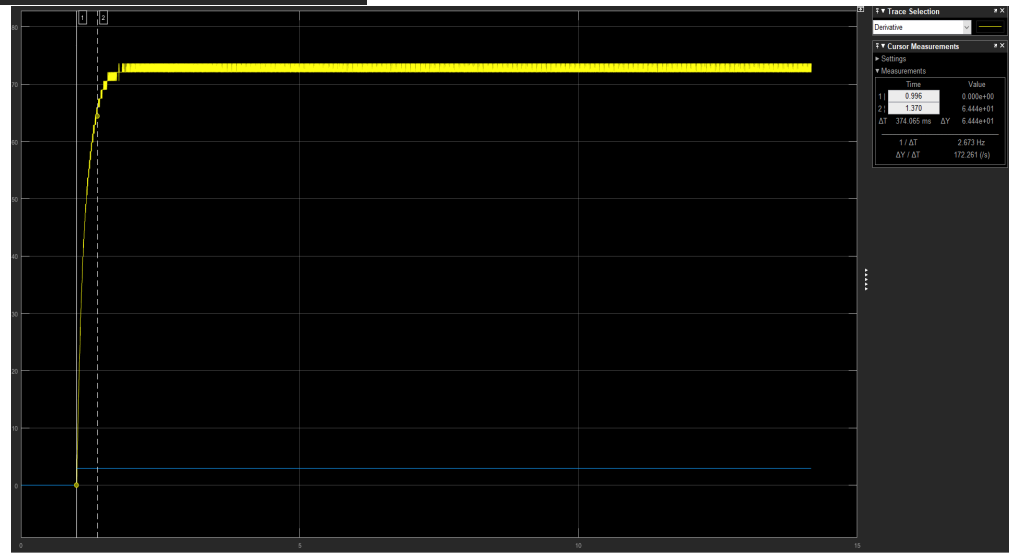
Mise en place du filtre



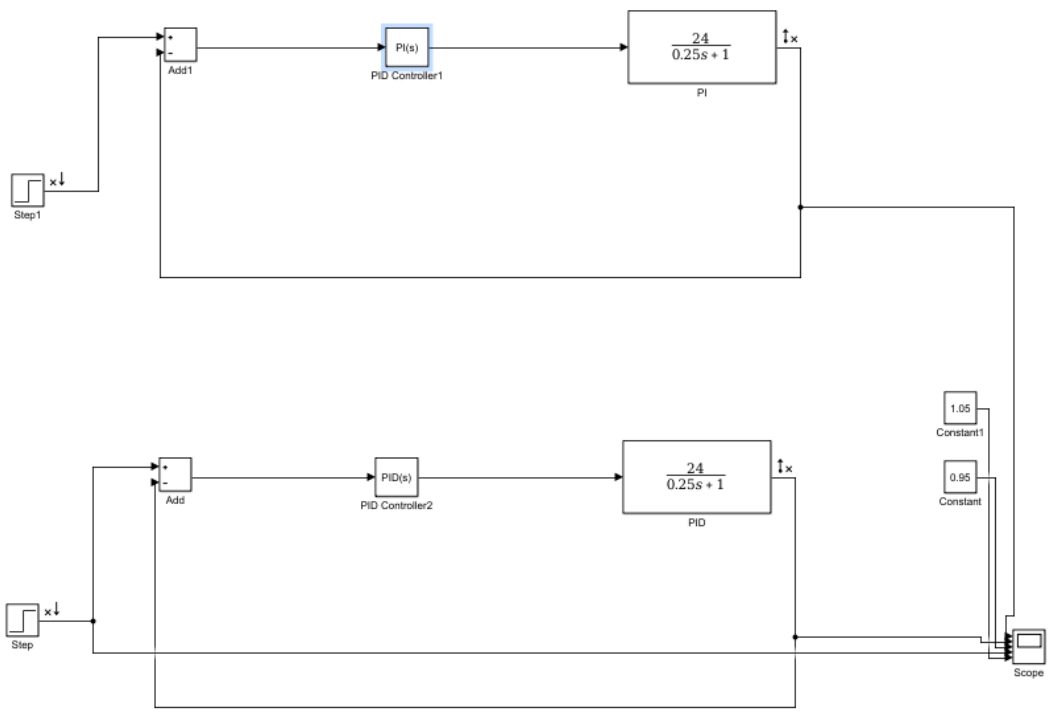
Identification du processus : Fonction de transfert



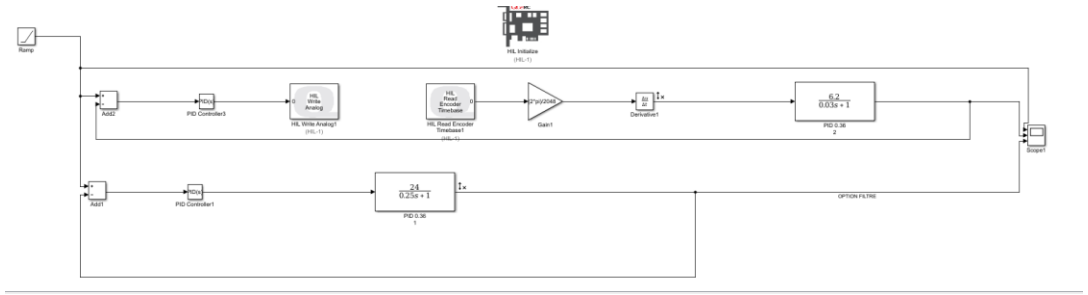




Synthèse d’un correcteur



Test PID



Main | PID Advanced | Data Types | State Attributes

Controller parameters

Source: internal

Proportional (P): 5.58*0.025+5.58*0.0025

Integral (I): 5.58

Derivative (D): 5.58*0.025*0.0025

Filter coefficient (N): 100

Tune...

Compensator formula

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

Main | PID Advanced | Data Types | State Attributes

Controller parameters

Source: internal

Proportional (P): 0.36*0.025+0.36*0.0025

Integral (I): 0.36

Derivative (D): 0.36*0.025*0.0025

Filter coefficient (N): 100

Tune...

Compensator formula

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

Initial conditions

Source: internal

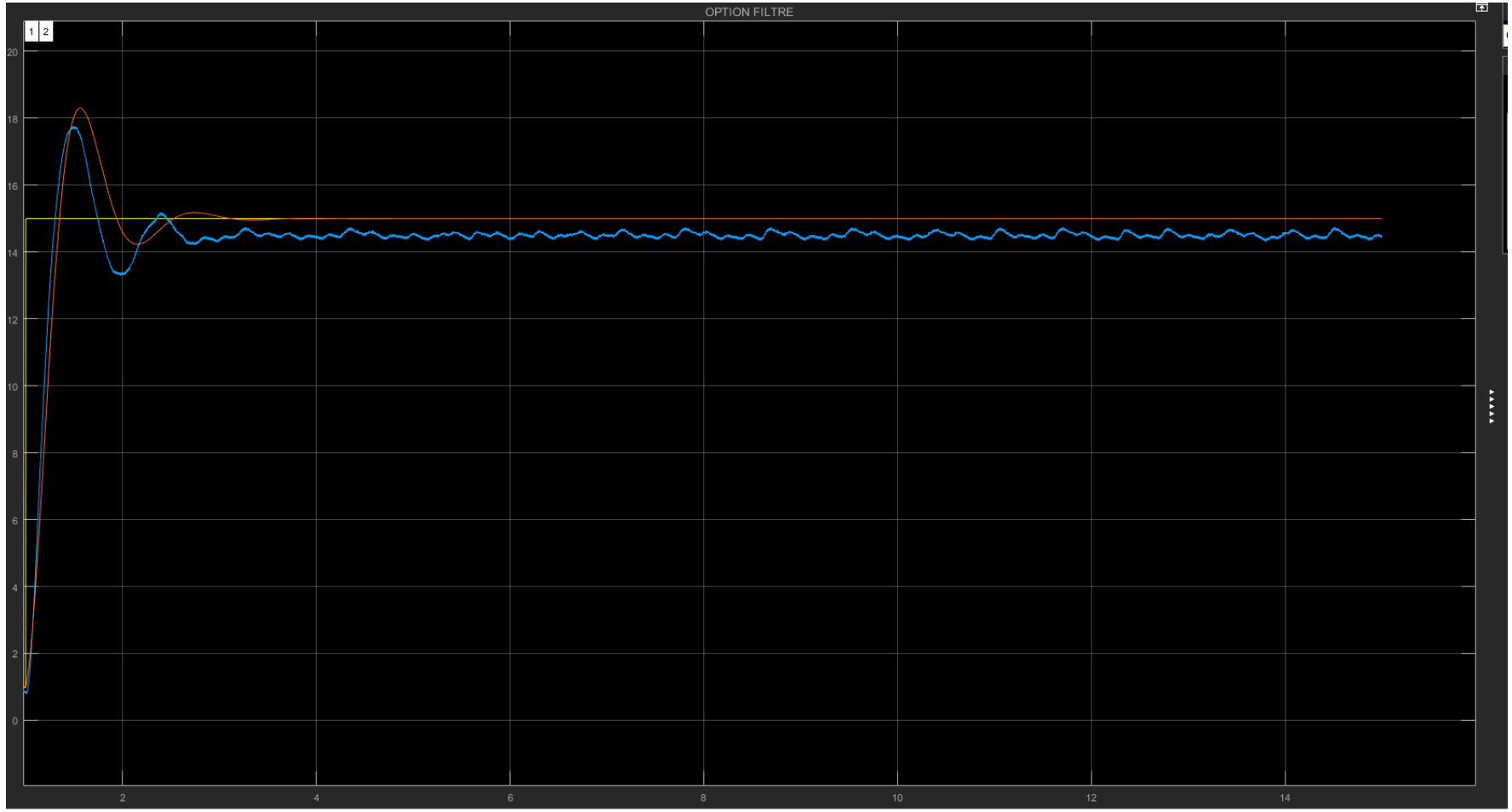
Integrator: 0

Filter: 0

External reset: none

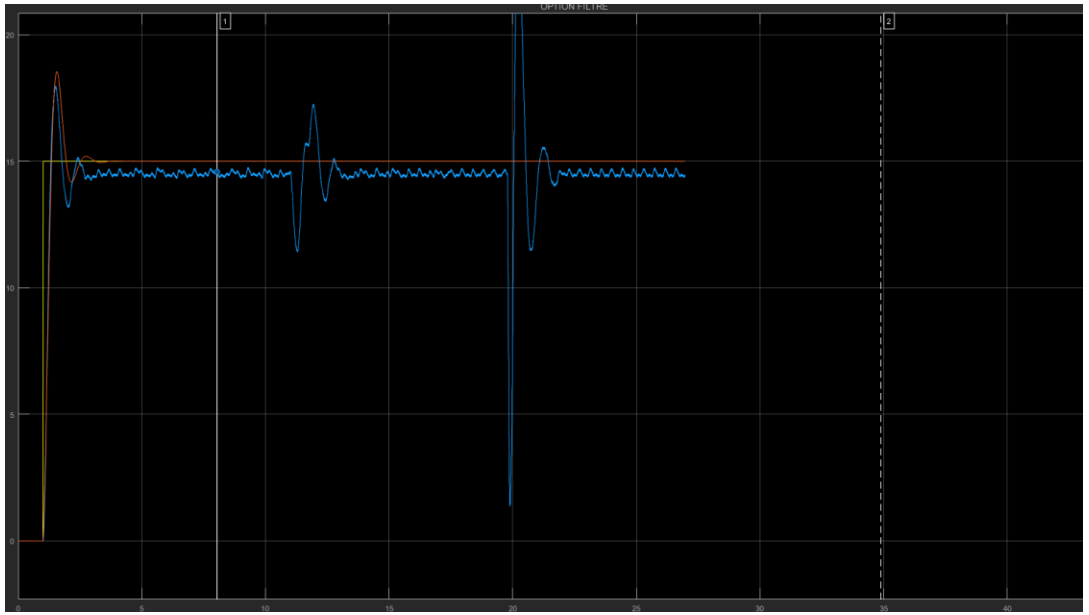
☐ Ignore reset when linearizing

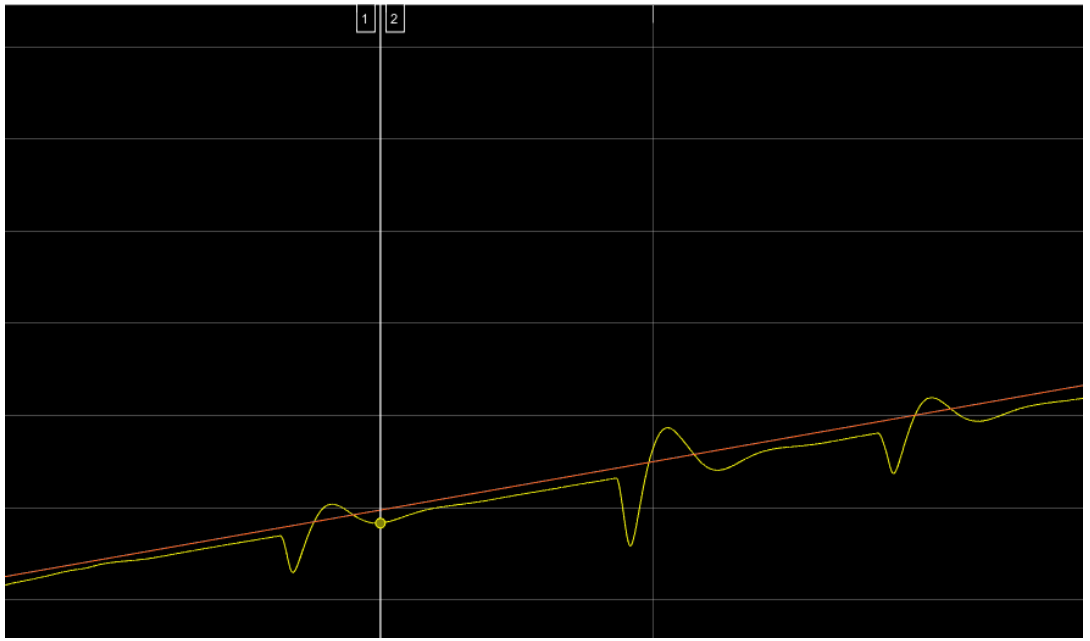
☑ Enable zero-crossing detection



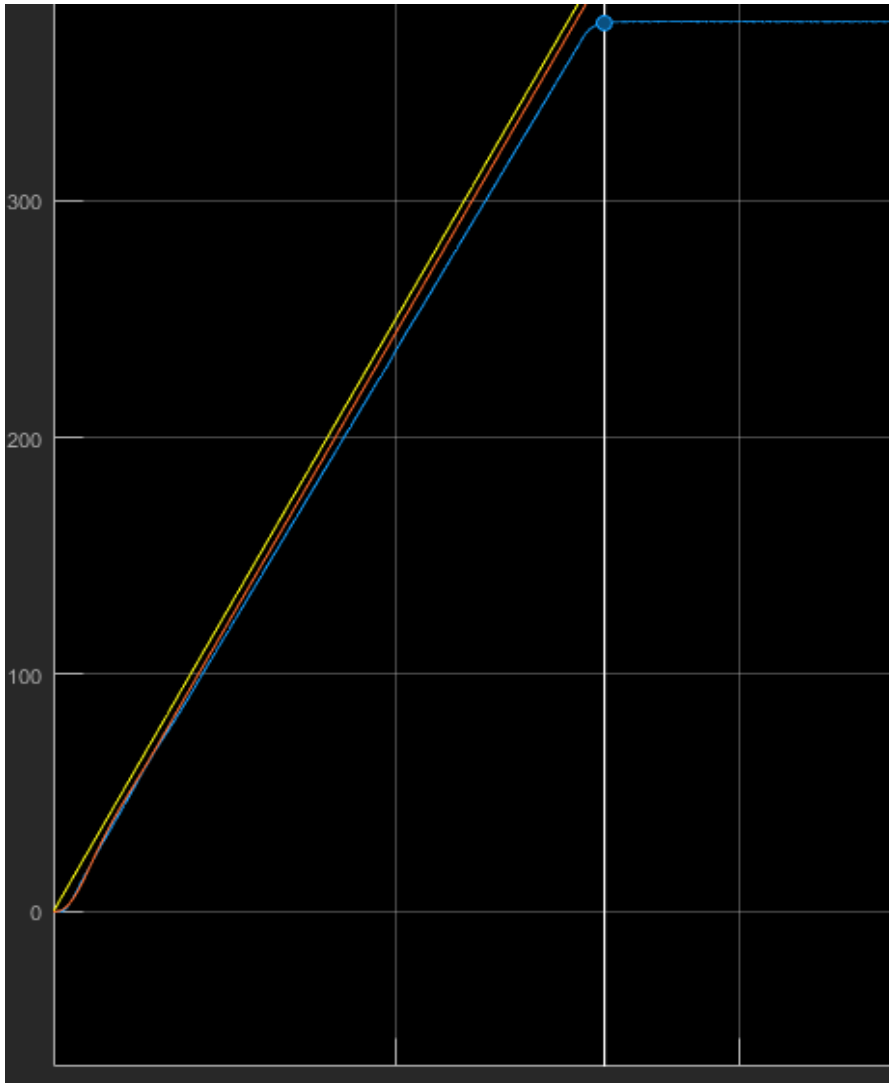
PID Echelon 15
Erreur 5%

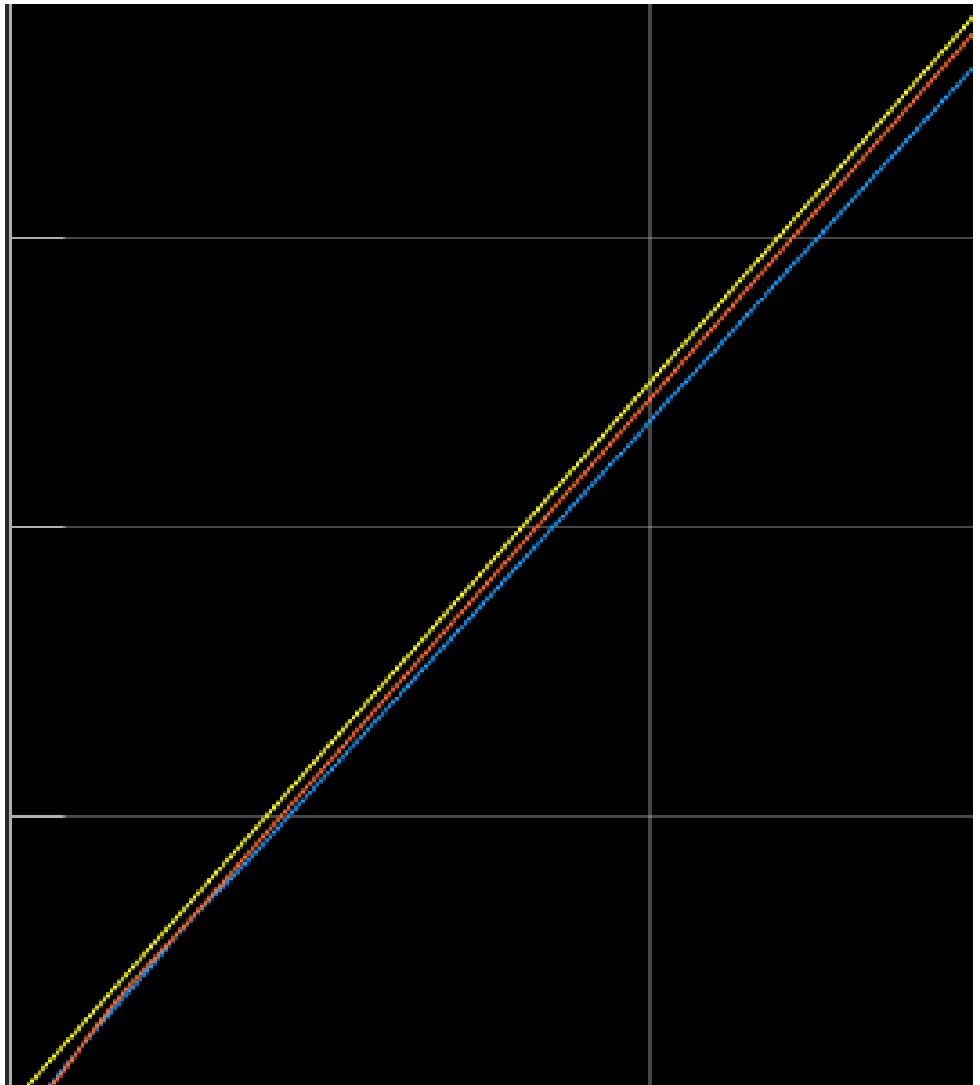
Déstabilisation
PID Rampe et échelon



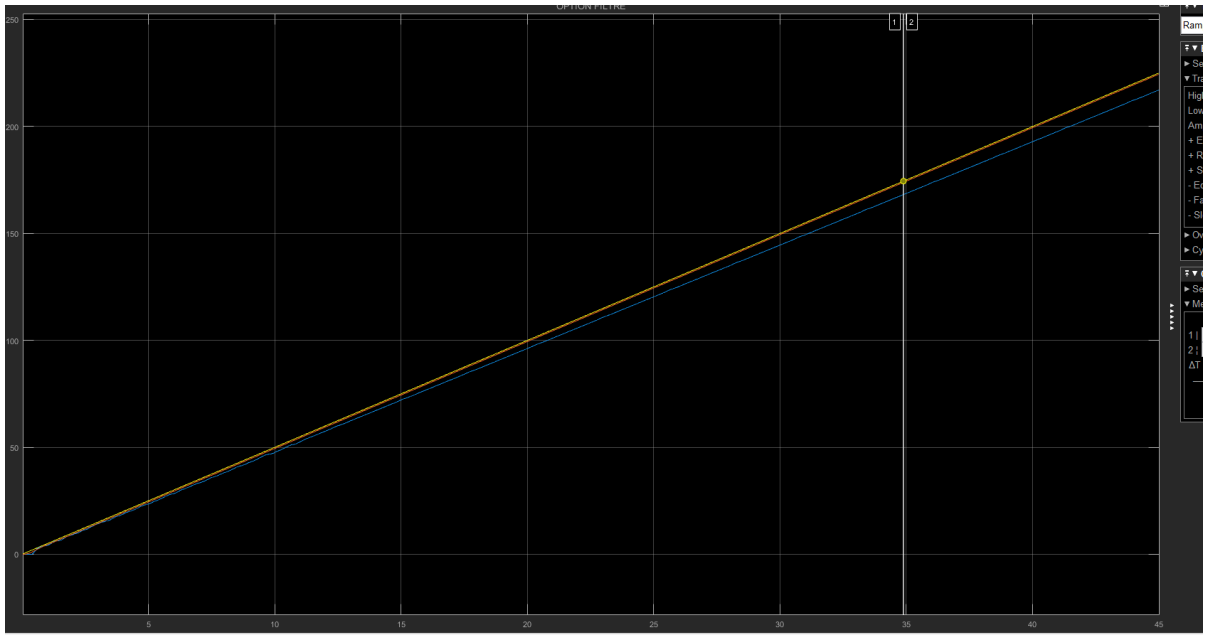


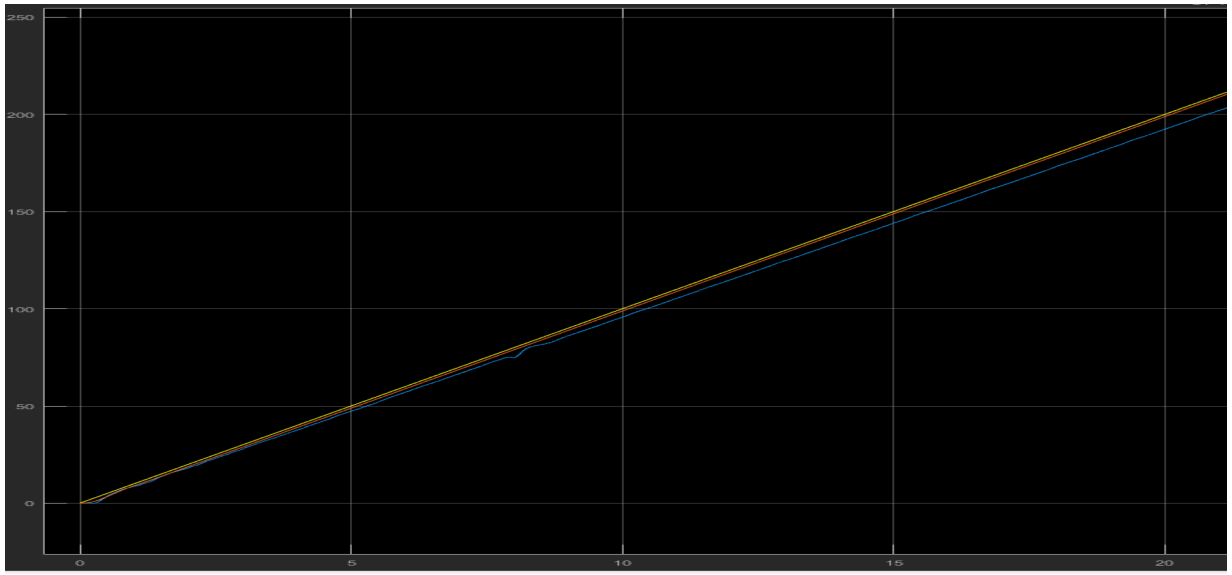
Rampe 50
Réel limite moteur 375 rad/s
Théorie infinie



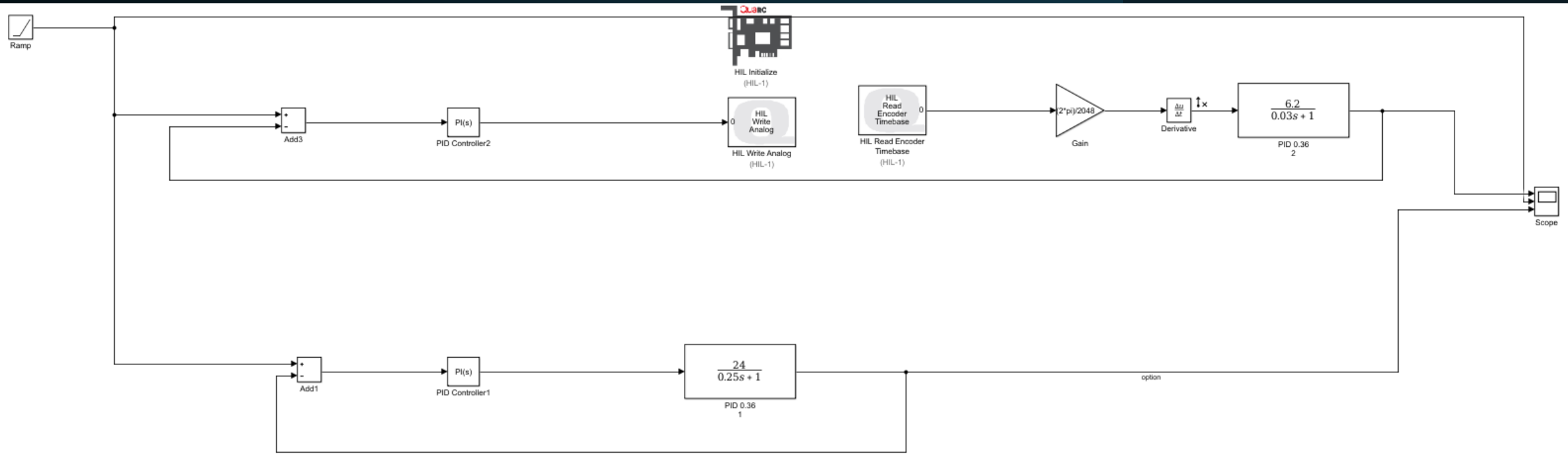


Ramp PID 5
5s Écart entre réel et théorie
6.4
Ramp PID 10
0s Écart entre réel et théorie
6.8





Test PI



Main | PID Advanced | Data Types | State Attributes

Controller parameters

Source: internal

Proportional (P): 7.9*0.025

Integral (I): 7.9

Tune...

Main | PID Advanced | Data Types | State Attributes

Controller parameters

Source: internal

Compensator formula

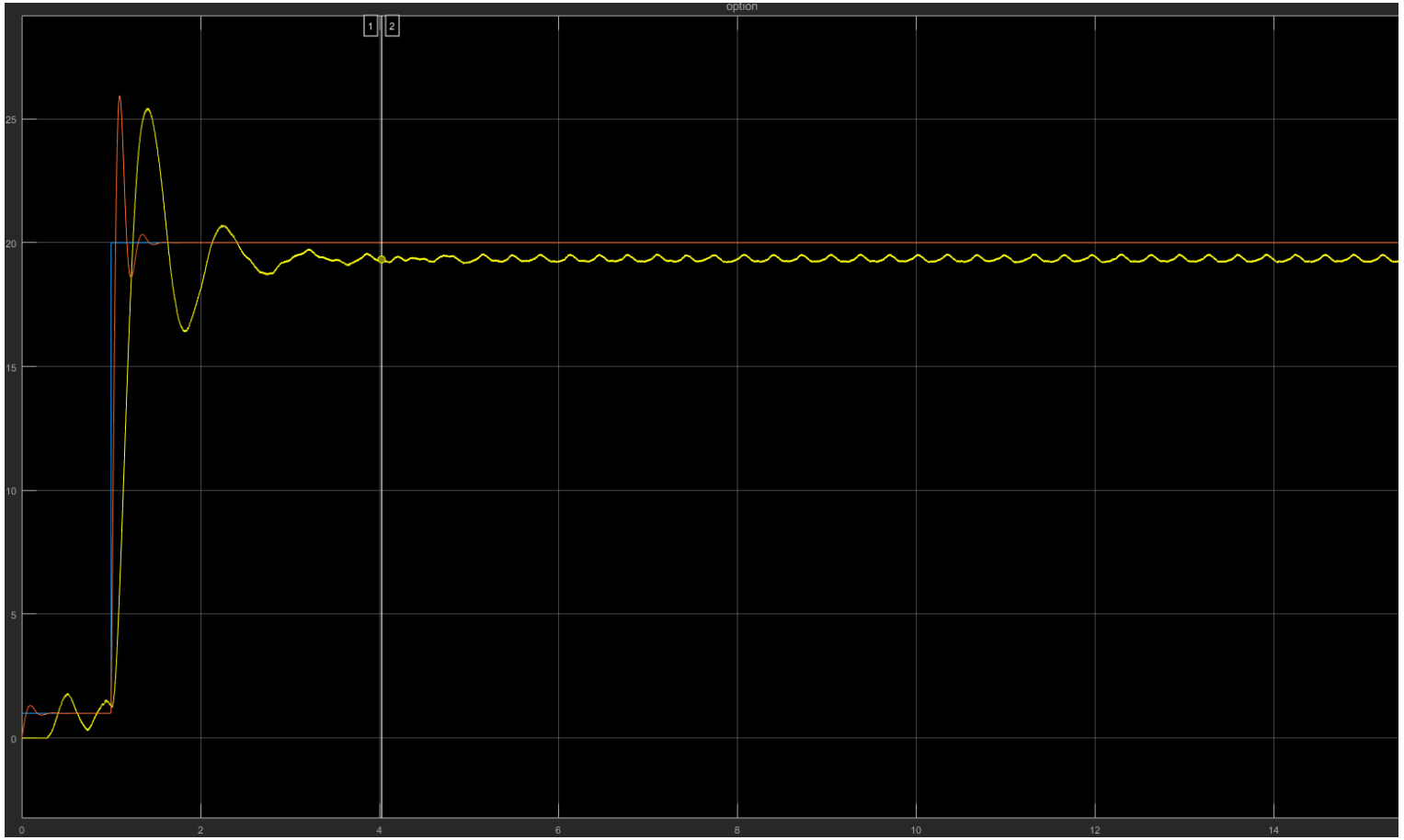
Proportional (P): 0.34*0.025

Integral (I): 0.34

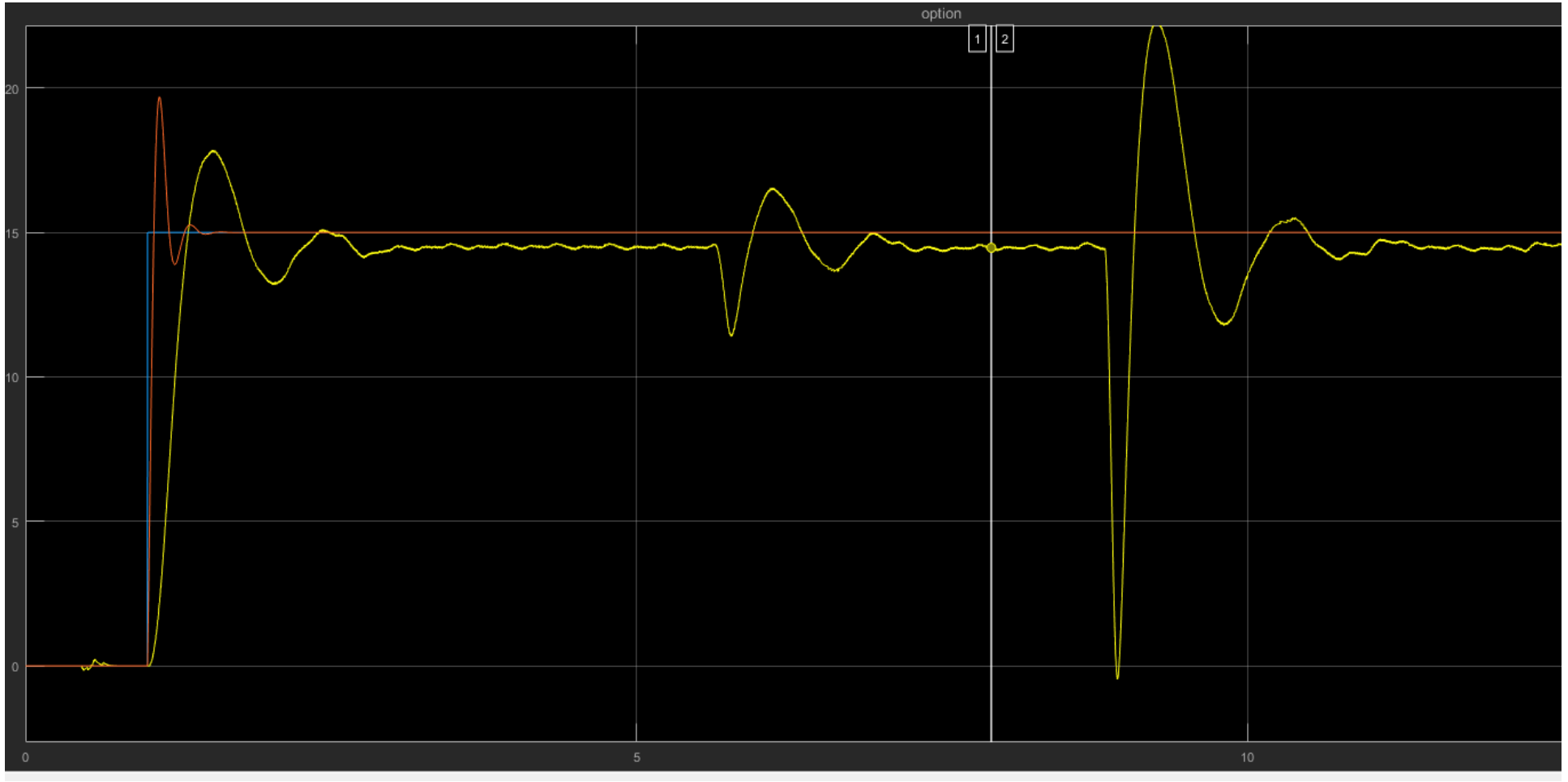
$P + I\frac{1}{s}$

Tune...

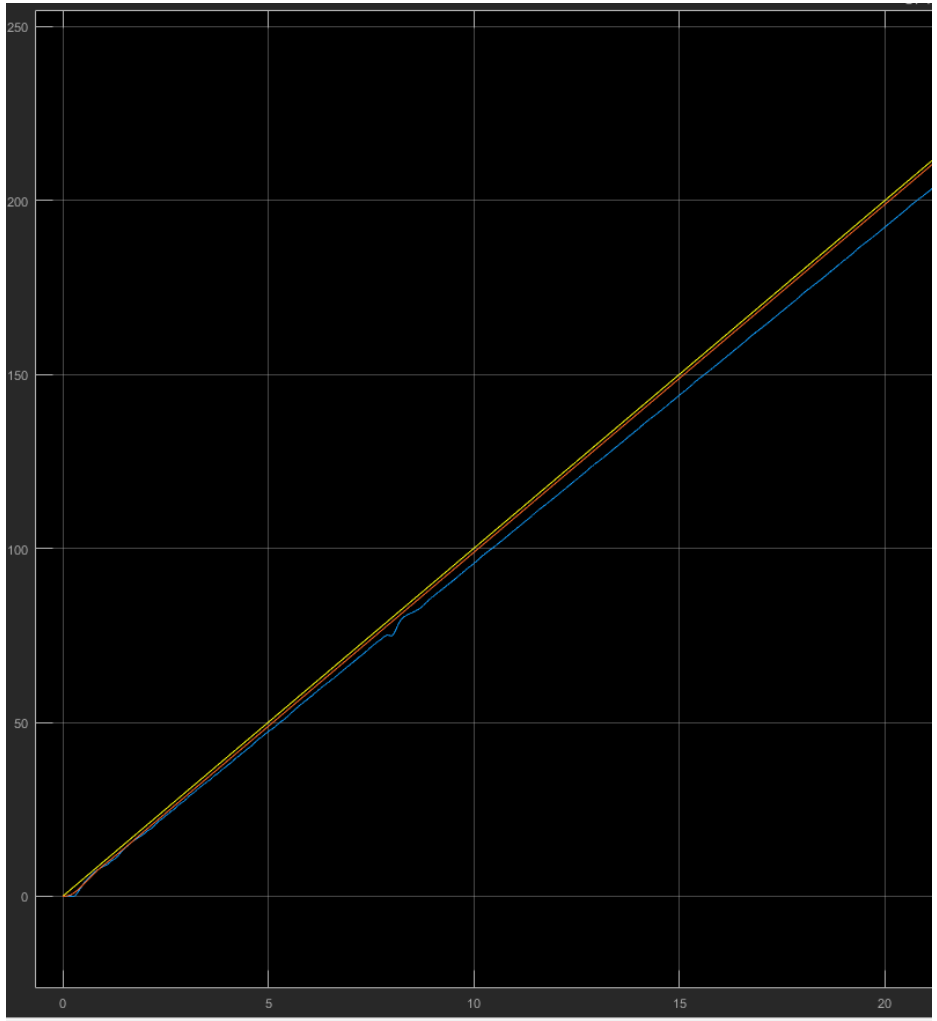
PI step 15

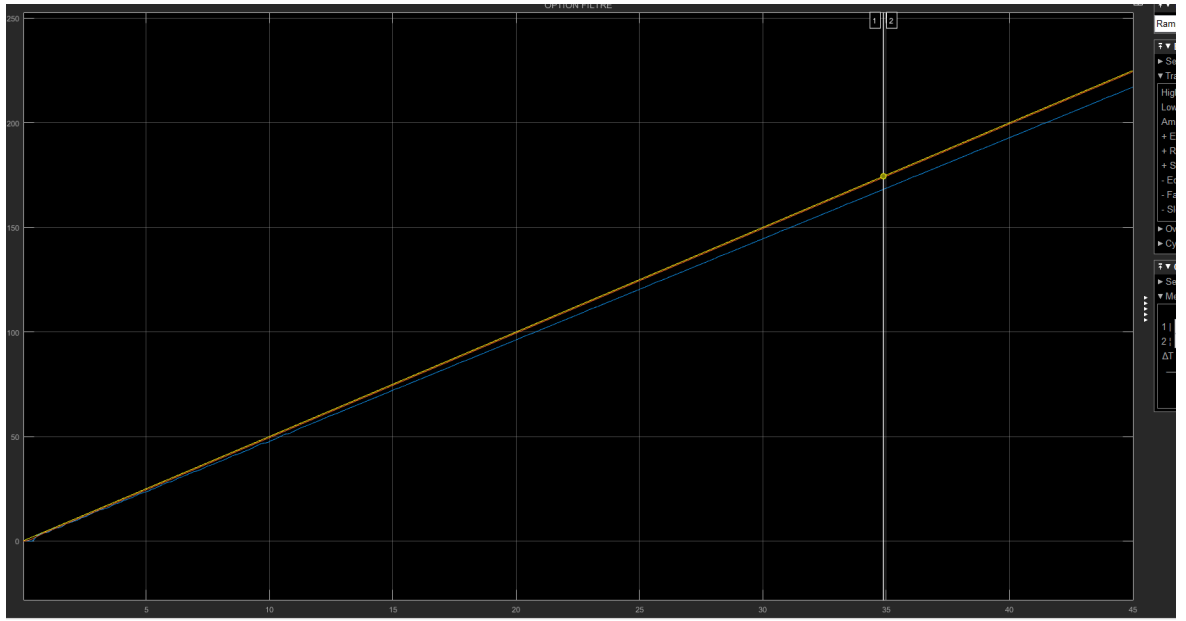


PI déstabilisation



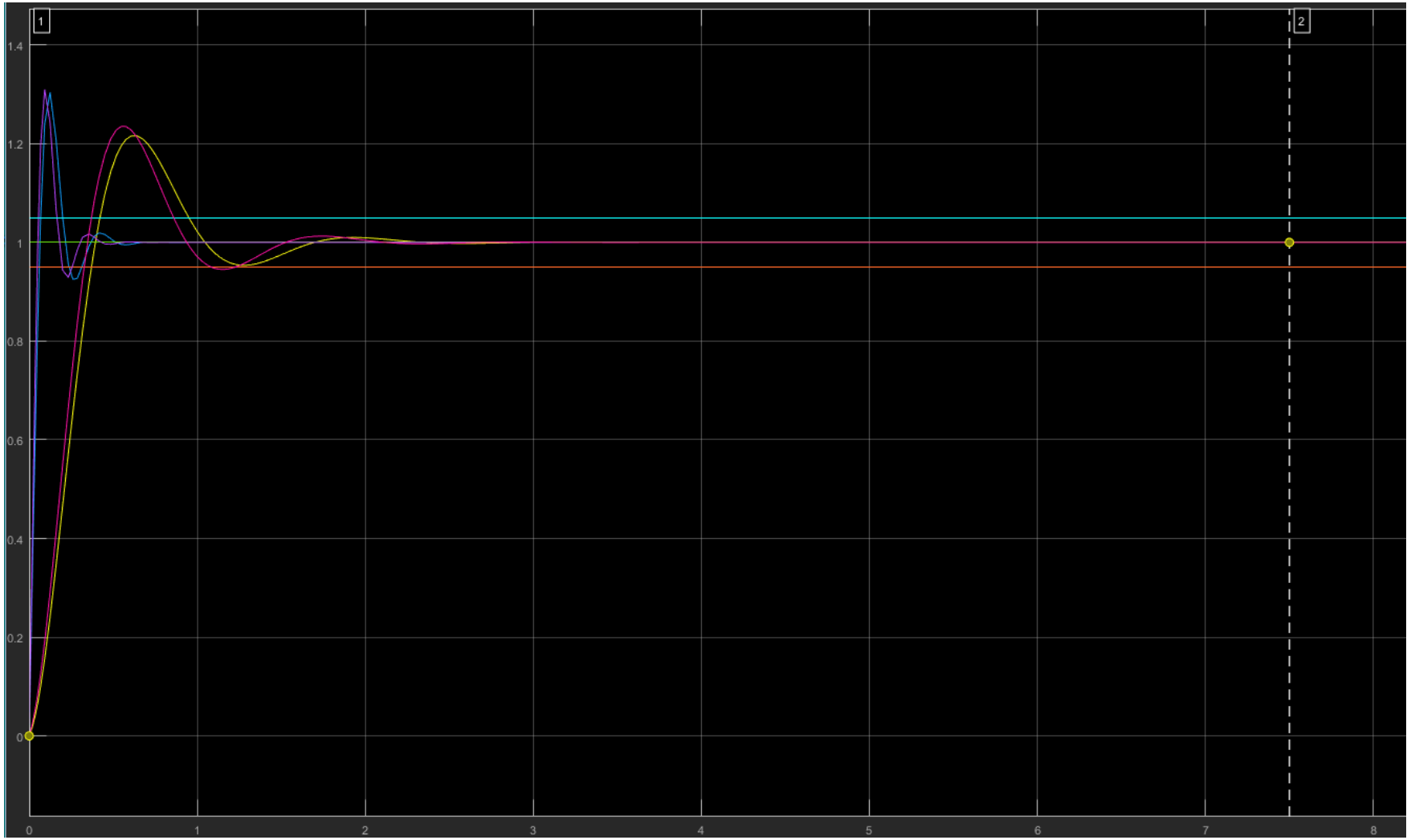
Rampe PI


250
200
150
100
50
0
0
5
10
15
20

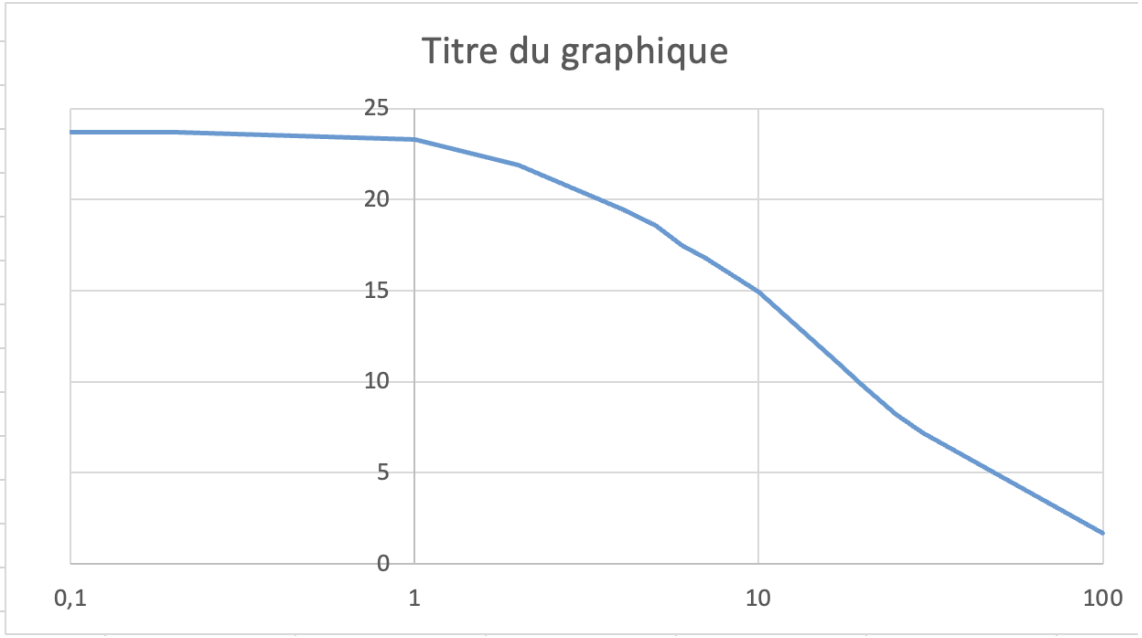

250
200
150
100
50
0
5
10
15
20
25
30
35
40
45

Rampe PI 50

PID VS PI



Problèmes rencontrés



Solution

Conclusion

Références

SAE 4.01,Mettre en oeuvre un système régulé