

Model Documentation of the Stable PT_n Element

1 Nomenclature

1.1 Nomenclature for Model Equations

K proportional factor
 $T_1, T_2, \dots T_n$ time constants

2 Model Equations

State Vector and Input Vector:

$$\underline{x} = (x_1 \ x_2 \ \dots \ x_n)^T$$
$$\underline{u} = u$$

Model Equations:

$$\dot{x}_1 = x_2 \tag{1a}$$

$$\dot{x}_2 = x_3 \tag{1b}$$

$$\vdots = \vdots \tag{1c}$$

$$\dot{x}_n = Ku - \mathcal{L}^{-1}(X(s) \prod_{i=1}^n (1 + T_i s)) \tag{1d}$$

Parameters: T_1, T_2, \dots, T_n

2.1 Assumptions

1. All parameters have real positive values.

2.2 Exemplary parameter values

For a PT₂ Element:

Parameter Name	Symbol	Value	Unit
Proportional Factor	K	3	
Time Constant 1	T_1	5	s
Time Constant 2	T_2	0.5	s

3 Derivation and Explanation

Not available

4 Simulation

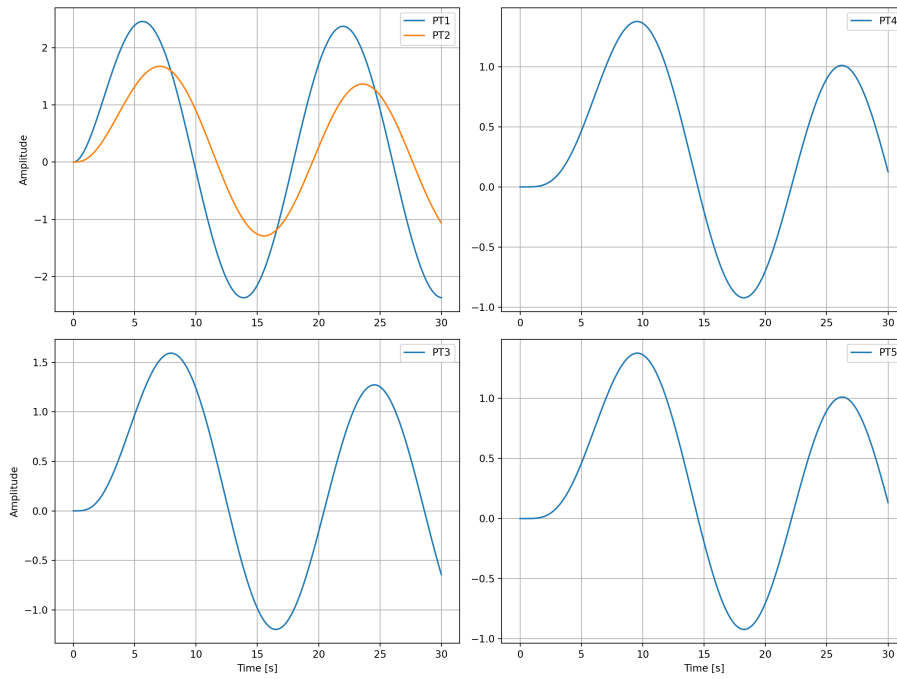


Figure 1: Simulation of the Stable PTn System.

References

- [1] Janschek, K.: *Mechatronic Systems Design*, p. 795, Springer-Verlag Berlin Heidelberg, 2012.