Model Documentation of the Stable PT_n Element

1 Nomenclature

1.1 Nomenclature for Model Equations

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

2 Model Equations

State Vector and Input Vector:

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

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: $T_1, T_2, \cdots, T_n$

2.1 Assumptions

1. All parameters have real positive values.

2.2 Exemplary parameter values

For a PT_2 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

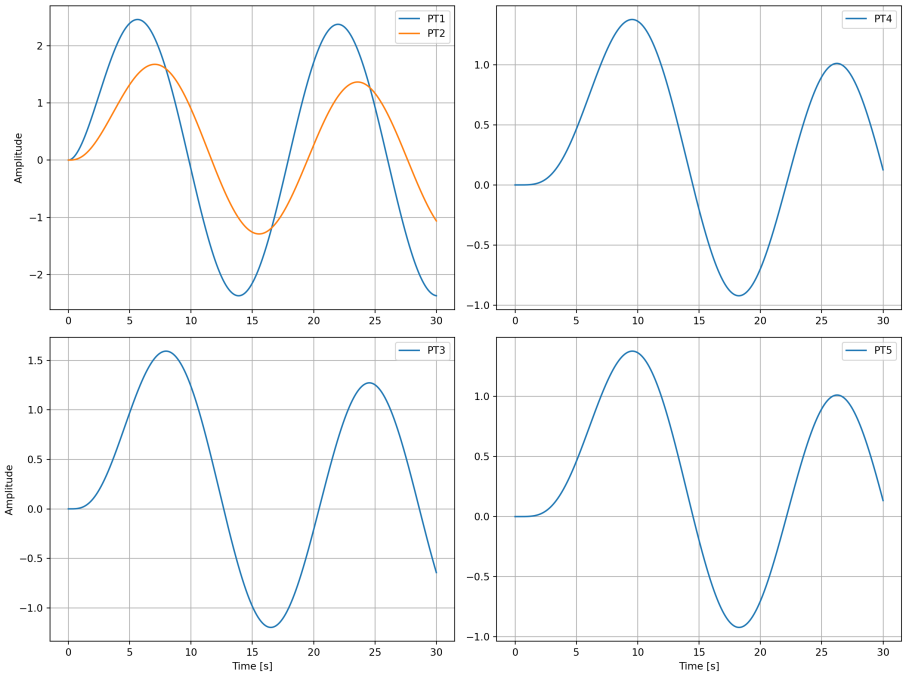

Figure 1: Simulation of the Stable PTn System.

References

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