FACULTY OF
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Handout
Controller tuning methods
Ziegler tuning method, $T_\sum$ method and Opelt tuning method

1 Introduction

In the following document different tuning methods with the corresponding table are explained. For some of these methods the inflectional tangent is used. This tangent and the corresponding parameters are defined in figure 1.

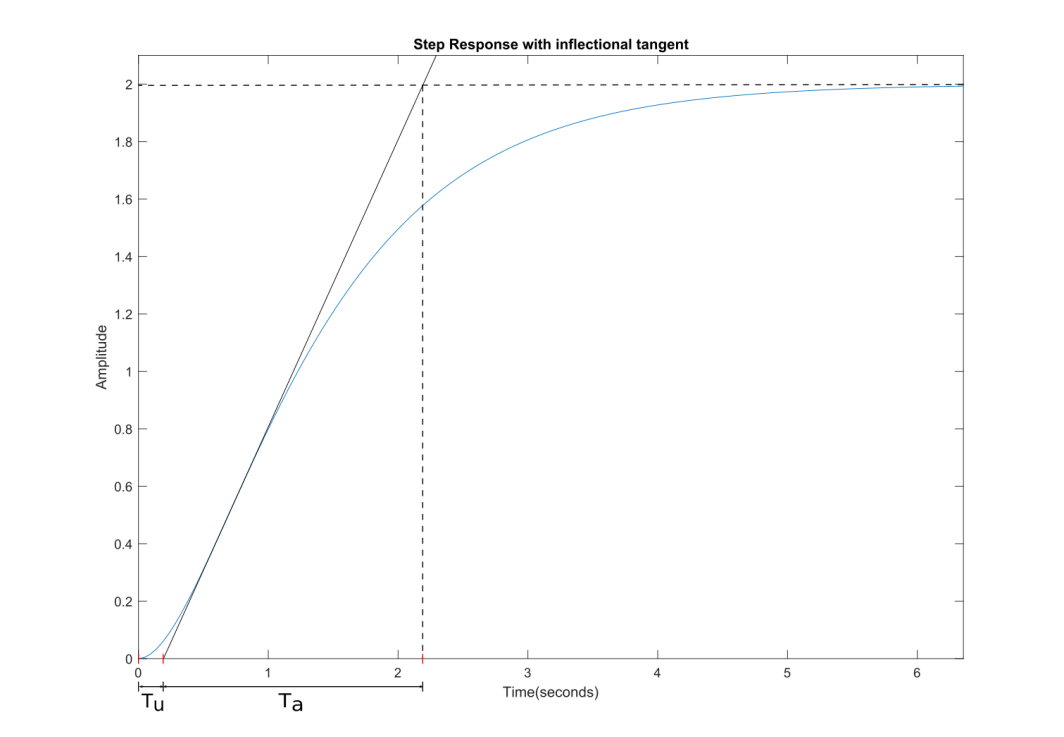

Figure 1: Step response with the inflectional tangent and the parameters T_u and T_a

2 Parameter calculation

In the following table the parameters of the different tuning methods are described. In table 2 the constant $T_{\sum}$

$$T_{\sum} = \sum T \tag{1}$$

is used as the sum over all time constants.

Table 1: Ziegler tuning parameters

Controller	K_R	T_I	T_D
P	$\frac{T_a}{K_S \cdot T_u}$		
PI	$0.9 \cdot \frac{T_a}{K_S \cdot T_u}$	$3.33 \cdot T_u$	
PID	$1.2 \cdot \frac{T_a}{K_S \cdot T_u}$	$2 \cdot T_u$	$0.5 \cdot T_u$

Table 2: $T_\sum$ tuning parameters

Controller	K_R	T_I	T_D
P	$\frac{1}{K_S}$		
PI	$\frac{1}{K_S}$	$0.7 \cdot T_\sum$	
PID	$\frac{2}{K_S}$	$0.8 \cdot T_\sum$	$0.194 \cdot T_\sum$

Table 3: Opelt tuning parameters

Controller	K_R	T_I	T_D
P	$\frac{T_a}{K_S \cdot T_u}$		
PI	$0.8 \cdot \frac{T_a}{K_S \cdot T_u}$	$3 \cdot T_u$	
PID	$1.2 \cdot \frac{T_a}{K_S \cdot T_u}$	$2 \cdot T_u$	$0.42 \cdot T_u$