

1 Objective

Experimental investigation of the reference variable response and disturbance response of closed loop controls without and with intermeshing using a closed loop model

2 Preparation

2.1 Repeat the content of chapter 1 of the course!

2.2 Disturbance feed forward on the actuating element (a) and on the controller (b)

- Calculation of the controller parameter (K_P , T_N und T_V) according to the Technical optimum without intermeshing ($T_\Sigma = 0,002$ s ; $T_1 = 0,02$ s ; $T_2 = 0,05$ s)
- Determination of the correction element FK in Fig. 2.1.a and 2.1.b (transfer function and parameter) for the approximate compensation of the disturbance impact

2.3 Stabilising auxiliary controlled variable (a) and disturbance compensating auxiliary controlled variable (b)

- Calculation of the controller parameter according to the Technical optimum without intermeshing for exercise b ($T_2 = 0,05$ s ; $T_0 = 0,2$ s)
- Determination of the correction element FK in Fig. 2.3a (transfer function and parameter) for the approximate compensation of the time constant T_2
- Determination of the correction element FK in Fig. 2.3b (transfer function and parameter) for the compensation of the steady state error

3 Duties

- Assemble the control systems according Fig. 2.1.a - Fig. 2.3.b. Choice and parameterization of the correction elements and controller will be done by switches and potentiometers according to Tab. 1 and to the calculated values.
- Measure by use of the storage oscilloscope the step response (step amplitude 0,1 V) for the reference variable response and disturbance response of the control circuit without (correction element switched off) and with (correction element switched on) intermeshing.
- Determine the performance indices for the reference variable response (control rise time, control settling time and overshoot) and for the disturbance response (maximum of the error variable, control settling time) and store the course of transient behaviour in a qualitative way.

4 Report (Interpretation)

- Summarization of the determined performance indices for the reference variable response and disturbance response
- Comparison of the measurement results and discussion of the effect of the correction elements

Switch setting			Transfer function
S1	S2	S3	
1	1	1	PD
1	0	1	D
0	1	1	P
1	0	0	DT ₁
1	1	0	PDT ₁

Tab. 1: Transfer behaviour of the correction elements

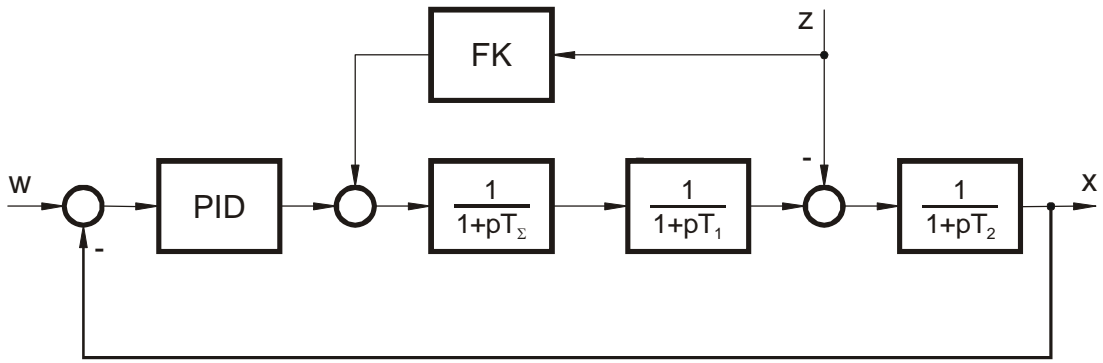


Fig. 2.1.a

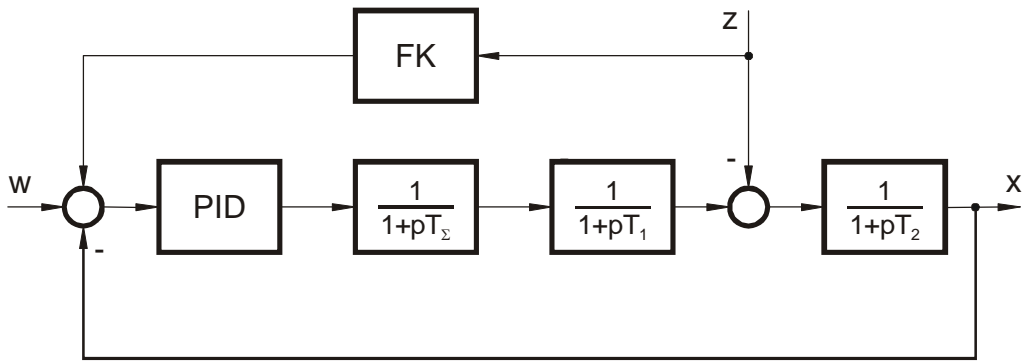


Fig. 2.1.b

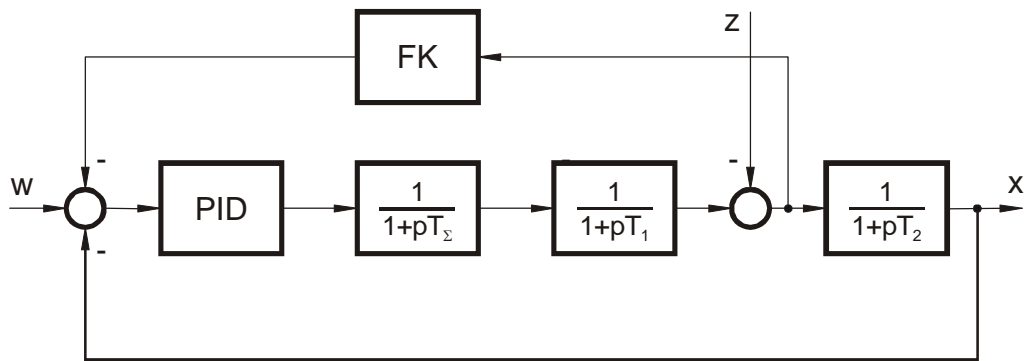


Fig. 2.3.a

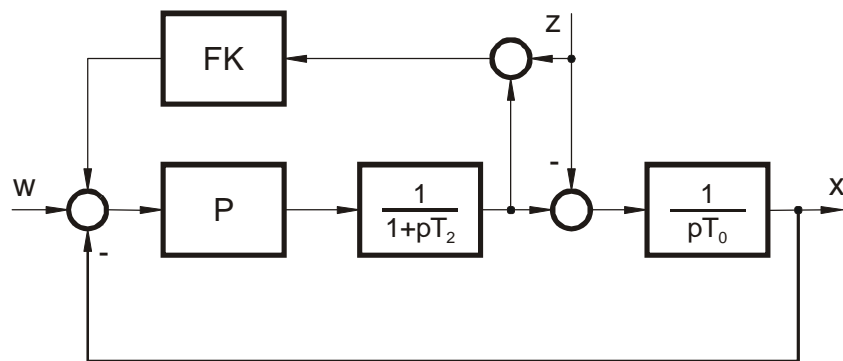


Fig. 2.3.b