TDC Prakt_RT2_05TDC	Course: Automatic Control Theory Exercise: Time-discrete Control TDC	Fakultät Elektrotechnik und Informatik

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Lab. Eng.: DI Sbieschni

1 Objective

The behaviour of a speed control has to be analyzed using a time-discrete controller adjusted according to the Time-discrete Technical Optimum BOD or for finite settling time.

You will find all necessary information about experiment set-up and handling of the devices in the instruction of exercise„Virtual-continuous control VCC“.

2 Preparation

2.1 Repeat the corresponding chapters of the course!

2.2 Ascertain the transfer function for a time-discrete controller according to the Time-discrete Technical Optimum for the control circuit shown in Fig. 1. using the parameters given in section 4. Act thereby on the assumption of a continuous PID-controller. Ascertain the controller coefficients fort he sampling times given in Table 1 and e = 0.

2.3 Ascertain the transfer function for a time-discrete controller with finite settling time for the control circuit shown in Fig. 1. Design the transfer function for a settling time of three sampling Steps and $y_0 = y_1$. Calculate the controller coefficients fort he sampling times given in Table 1.

Stand	T_{A1}	T_{A2}	T_{A3}	T_{A4}	T_{A5}
4	5 ms	30 ms	60 ms	120 ms	240 ms
5	5 ms	20 ms	50 ms	90 ms	180 ms

Table 1

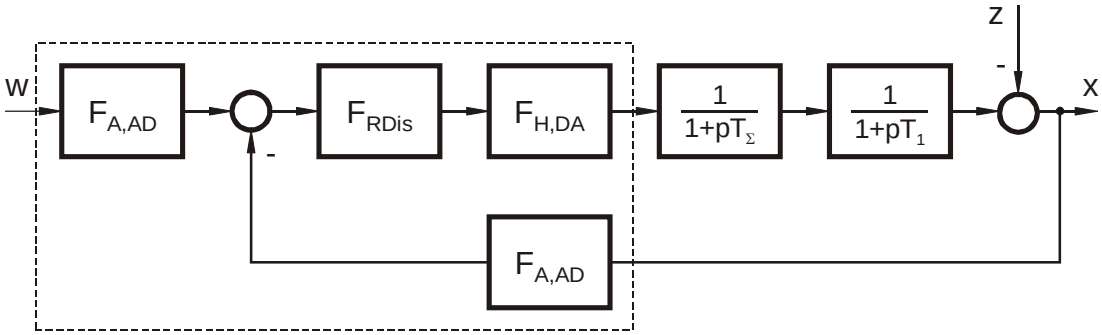

Fig. 1

3 Literature

[1] Proske, D.; Regelungstechnik, Berechnung von Regelkreisen - Teil 2 Entwurf von Reglern für einschleifige Regelkreise. FB Elektro- und Informationstechnik an der Hochschule Zittau/Görlitz

[2] Proske, D.; Regelungstechnik, Digitale Regelung. FB Elektro- und Informationstechnik an der Hochschule Zittau/Görlitz

[3] Schönfeld, R.; Regelungen und Steuerungen in der Elektrotechnik; 1. Auflage 1993, Berlin, München: Verlag Technik

[4] Geitner, G.-H.; Entwurf digitaler Regler für elektrische Antriebe, 1996, Berlin, Offenbach: VDE-Verlag GmbH

[5] Unbehauen, H.; Regelungstechnik II; 6. Auflage 1993, Braunschweig/Wiesbaden: Friedr. Vieweg u. Sohn Verlagsgesellschaft mbH

4 Experiment set-up

Parameters of the plant shown in Fig. 1:

Stand 4: $V_S = 0{,}53$; $T_1 = 0{,}32s$; $T_\Sigma = 0{,}06s$

Stand 5: $V_S = 0{,}56$; $T_1 = 0{,}22s$; $T_\Sigma = 0{,}045s$

5 Duties

Measure the Step responses for all sampling times given in Table 1 using the coefficients according to section 2.2 and 2.3. The step response to each sampling time has to be measured and stored three times.

Enter the coefficients into module OB35 of the prepared project DigRegBOD or DigRegEEZ. Enter the sampling time as „Cycle Interrupt“ in the program „HW Config“. Transmit the changed modules subsequently to the PLC using the command „CPU“ -> „Download“.

The excitation of the dc motor has to be switched on by parameterization of the rectifier SIMOREG. Adjust the feeding voltage of the dc chopper converter to 220V. Determine the operating point of the speed to 750 min^{-1} by applying of 4 V dc at the input of the dc chopper converter. Add a ±0,25 V square wave voltage form a wave form generator for the measurement of the step response. Measure the speed at the analogue output Aout1 of the SIMOREG with channel 1 of the PC measurement board.

Measure the actuating variable by use of channel 2. Channel 0 will be used for triggering and has to be connected to the output of the wave form generator.

6 Report (Interpretation)

Evaluate the exercise results and compare them with the values given in the lecture!