Laboratory report

|  |  |
| --- | --- |
| Subject of the exercise: | Identification and control of linear systems (Exercise 8.) |
| Date: | <year>. <month>. <day> |
| Students name: | <name 1> <name 2><name 3> |
| Course and group No. | Course: <Course No>, <Group No.> |
| Supervisors: | <name 1>, <name 2> |
| Desk No.: |  |

Equipment in use, device under test

|  |  |  |
| --- | --- | --- |
| Oscilloscope | Agilent 54622A | MY4< > |
| Signal generator | Agilent 33220A | MY4< > |
| Power supply | Agilent E3630 | MY4< > |
| Data acquisition card | Advantech PCI-1711 | No. of PC: < > |
| Test circuit | BME-VIK/11 | <> |

Laboratory tasks

1. **Analysis of the plant with external instruments**
	1. **Excitation signal used for analysis**

|  |  |
| --- | --- |
| Type |  |
| Frequency |  |
| Amplitude |  |

<Figure of the excitation signal>

* 1. **Approximation of the parameters of the plant**

<Figure of the output signal of the plant>

< Summarize briefly how you have computed the results >

|  |  |
| --- | --- |
| DC gain |  |
| $$ω\_{0}$$ |  |
| $$ξ$$ |  |

* 1. **Sampling time for data acquisition and control**

**<** Summarize briefly how you have selected the given sampling time **>**

1. **Identification of the plant**
	1. **Excitation signal used for identification**

|  |  |
| --- | --- |
| Suggested sampling time |  |
| Amplitude |  |
| Change probability |  |
| Min. pulse length |  |
| Samples |  |

<Figure of the excitation signal>

* 1. **Data acquisition**

<Figure of the measured output signal of the plant>

* 1. **Parametric identification**

<Figures showing the results of identification and error for the LS, ARX, IV4 and ARMAX models>

* 1. **Evaluation of the results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameters | LS | ARX | IV4 | ARMAX |
| $$A\_{3}$$ |  |  |  |  |
| $$ω\_{0}$$ |  |  |  |  |
| $$ξ$$ |  |  |  |  |

**<** Evaluate the results and select the best model for control design **>**

1. **Control design**
	1. **Controller parameters**

**<** Briefly summarize the reasons for choosing the given closed loop poles **>**

|  |
| --- |
| Prescribed poles for the closed loop |
| $$s\_{c1}$$ |  |
| $$s\_{c2}$$ |  |
| $$s\_{c3}$$ |  |

**<** Briefly summarize the reasons for choosing the given observer poles **>**

|  |
| --- |
| Observer poles |
| $$s\_{o1}$$ |  |
| $$s\_{o2}$$ |  |
| $$s\_{o3}$$ |  |

<Screenshot of the Matlab console application showing controller parameters>

* 1. **Simulation of the closed loop**

<Figure of the output signal of the simulated closed loop>

**<** Evaluation of the results **>**

* 1. **Verification of the controller using the physical plant**

<Figure of the measured output signal of the physical plant>

**<** Comparison of the simulated and measured signals and evaluation of the results**>**

1. **Test of robustness**
	1. **Analysis of the closed loop with perturbed plant**

<Figure of the measured output signal of the perturbed physical plant>

**<** Evaluation of the results**>**

* 1. **Load estimator design**

**<** Briefly summarize the reasons for choosing the new observer poles **>**

|  |
| --- |
| Observer poles |
| $$s\_{o1}$$ |  |
| $$s\_{o2}$$ |  |
| $$s\_{o3}$$ |  |
| $$s\_{o4}$$ |  |

<Figure of the output signal of the simulated closed loop with the perturbed plant and the new controller>

* 1. **Verification of the controller**

<Figure of the measured output signal of the original physical plant with the new controller>

<Figure of the measured output signal of the perturbed physical plant with the new controller>

< Evaluation of the results >