**Practical session 2 : Identification of a hydraulic system**

**(Questionnaire)**

Fill in the questionnaire and hand out it at the end of the session

## 1.Identification of the linear model block .

## .1.1 Experiment 1 (simulator\_P2\_1.mdl)

|  |  |  |
| --- | --- | --- |
| **Identified parameters** | | 0.9539  0.1303  0.0949 |
| **Are the results accurate?**  **Why?** | They are not really accurate to the theoretical parameters. The difference between the value we got and the reference value is:  Difference in is -2.0177%.  Difference in is 56.4147%.  Difference in is 7.3583%.  Because we have a long time constat periods and the model sees the noise and tries to work against it. Pole placement is fast. | |

**1.2** Experiment 2 (simulator\_P2\_2.mdl)

|  |  |  |
| --- | --- | --- |
| **Identified parameters** | | 0.9740  0.0813  0.0865 |
| **Is there any change in the results?**  **Why?** | These results are very close to theoretical parameters. The difference between the value we got and the reference value is:  Difference in is 0.0532%.  Difference in is -2.4537%.  Difference in is -2.1444%.  In this simulation its better because the gain is greater and the pole placement is not as fast as in the first one. | |

**1.3** ARX function

|  |  |  |
| --- | --- | --- |
| **ARX call** | sys = arx(z,[1,[1 1],[1 1],[1 1]]) | |
| **Parameters of the ARX function** | A(z) = 1 - 0.974 z^-1  B1(z) = 0.08126 z^-1  B2(z) = 0.0865 z^-1 | |
| **Identified parameters** | | 0.974  0.08126 0.0865 |

## 2. Identification of the nonlinear model block .

**2.1** Experiment 1 (simulator\_P2\_1.mdl)

|  |  |  |
| --- | --- | --- |
| **Identified parameters** | | 0.9659  0.0721  0.0280 |
| **Compare with the ones obtained in 1.1** | Comparing to the results we obtained from linear model, there is not a big difference in first parameter but in other two. The difference between the value we got and the reference value is:  Difference in is 1.2559%.  Difference in is -44.6290%.  Difference in is -70.4580%.  In linearized model we operate with the small area and this is not the case for non-linear model, because the working point is grater. | |

**2.2** Experiment 2 (simulator\_P2\_2.mdl)

|  |  |  |
| --- | --- | --- |
| **Identified parameters** | | 0.9752 0.0782  0.0367 |
| **Compare with the ones obtained in 1.2** | Comparing to the results we obtained from linear model, there is not a big difference in first and second parameter, but in third there is. The difference between the value we got and the reference value is:  Difference in is 0.1209%.  Difference in is -3.7538%.  Difference in is -57.5472%.  Similar to 2.1. | |

## 3. Extended regressor .

**3.1** Theoretical results

|  |  |
| --- | --- |
| **Theoretical parameter values** | 1  -0,1123  0,1123  0.0833 |

**3.2** Least squares results

|  |  |
| --- | --- |
| **Identified**  **parameters** | 0.9982  -0.1038  0.1080  0.0822 |
| **What is the advantage of this model?** | The advantage is that this is a discrete model. Most of the models are discrete and good thing is that we don’t have to linearize it (which takes some time) and the results are quite accurate. |

**Finally, upload (atenea campus) the file:** Four\_tanks\_session\_2\_NAME.m **with all the computations of the session.**