

Tutorial sheet

Intro to SysID toolbox in Matlab

1. **help ident:** this will give you a gist of all commands available in the sysid toolbox.

2. **help idpoly:** Lets define an ARMAX(2,2,1) model using the command idpoly
Apoly = [1 -1.5 0.7]; Bpoly = [0 0.8 -0.6]; Cpoly = [1 -0.7];
Assume the standard deviation of noise is 5% of steady-state gain

3. **help step:** Run step test on the model

4. **help idinput:** generate the input signal u as a PRBS sequence? Find out the difference between PRBS and RBS

5. **help iddata:** save the input signal as an iddata object

6. **help sim:** simulate the model using the above input signal with noise property turned on. This will give you the output

7. using the input and the corresponding output, generate a new iddata structure which will form a data set.

8. **help arx, help armax:** Now using the above data, estimate parameters for the following model structures

1. ARX (2,2)
2. ARX (10,10)
3. ARMAX (2,2,1)

9. Performance on identification set: Using your identification data, find the 1 step ahead prediction errors and find autocorrelation for each of the three models

10. **help resid:** perform a residual analysis for each of the three models.

11. Compare the step responses of the three models with the training set

12. **help bode:** Draw the bode plot for the three identified model and compare with the bode plot of the plant

13. Generate an independent validation set: Using the original model as the plant, repeat steps 4-7 to generate another data set, which we will use to validate the model.

13. Repeat step 9 for the validation set

14. What conclusion can you draw about the three models. Use the idea of occum's razor which sides with simplicity all else being the same.

15. **help compare:** compare the three identified models with the validation data

16. Since the plant was also a time series model (you will never know this in the real-world), compare the identified coefficients with those of the identified model.