

# system identification for control

## lecturers

Prof.dr.ir. P.M.J. Van den Hof,  
Eindhoven University of Technology  
Dr.ir. X.J.A. Bombois, Laboratoire  
Ampère, École Centrale de Lyon,  
France

## objectives

System Identification concerns the modeling of dynamical systems on the basis of observed data. The objective of this course is to present the important system identification techniques with a special attention to prediction error methods. Subspace and frequency-domain methods will be covered as well. We will consider both the cases of data collected in open loop and data collected in closed loop. Finally, the problem of the optimal design of the identification experiment will be addressed.

## contents

1. Introduction; concepts; discrete-time signal and system analysis
2. Parametric (prediction error) identification methods - model sets, identification criterion, statistical properties
3. Parametric (prediction error) identification methods - model validation, experiment design and approximate modelling
4. ETFE and frequency-domain identification
5. Closed-loop identification
6. Optimal identification experiment design
7. Extension on model structures and identification methods
8. Subspace identification

## prerequisites

Calculus and linear algebra. Some knowledge of statistics and linear systems theory and/or time series analysis is helpful, but not required. The lecture notes contain useful summaries of the important notions used during the course.

## lecture notes

Lecture notes will be distributed during the course.

## course assessment

The assessment of this course will be in the form of three homework assignments.