# Model structure and order selection strategy

#### **Delay estimation**

data1 = iddata(y1,u1,1)nk = delayest(data1)

## Residual analysis

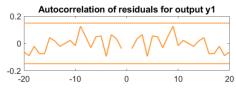
Parameter

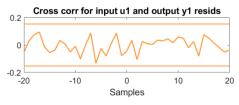
variance test

good.

BJ model with

minimum order





Cancel zeros

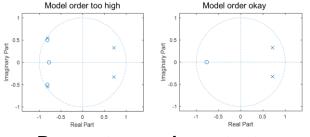
and poles if high

**↓** bad

BJ order

reduction

## Zeros and poles cancelation



#### Parameters variance test

- Example 1
  - $-A(q) = 1 1.397 (\pm 0.02608)q^{-1} + 0.5866 (\pm 0.01946)q^{-2}$
  - $-B(q) = 0.2026 (\pm 0.01475)q^{-2} 0.02881 (\pm 0.01828)q^{-3}$
  - $-C(q) = 1 0.9909 (\pm 0.1401)q^{-1} + 0.2294 (\pm 0.1311)q^{-2}$
- Example 2

Polynomials comparison

Cancel zeros

and poles if high

If F and D

are similar

Switch to ARMAX

without reducing order

Good

ARMAX model

with minimum

Yes ...

Parameter

variance test

- $-A(q) = 1 1.425 (\pm 0.01208)q^{-1} + 0.6122 (\pm 0.01146)q^{-2}$  value
- $-B(q) = 0.1113 (\pm 0.002952)q^{-1} + 0.08808 (\pm 0.003689)q^{-2}$
- $-C(q) = 1 0.3811 (\pm 0.04841)q^{-1}$

ARX with

minimum order

**Polynomials** comparison

Bad

ARMAX order

reduction



Non-parametric

Analysis

Remove the mean and trend

Filter data if

necessary

Delay estimation

