Assignemt 5

1.(u1, y1)

a) The selected model structure: oe323

b) oe323 =

Discrete-time OE model: y(t) = [B(z)/F(z)]u(t) + e(t)

B(z) = 1.242 (+/- 0.03715) z^-3 + 0.75 (+/- 0.06609) z^-4 + 0.9234 (+/- 0.04139) z^-5

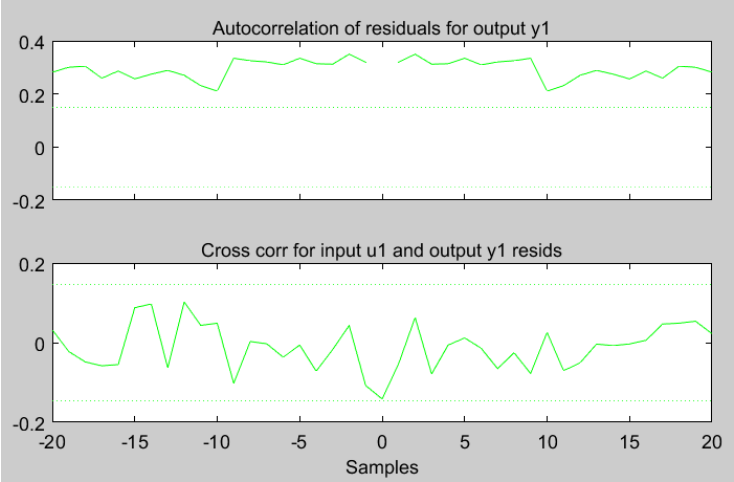
F(z) = 1 - 1.699 (+/- 0.0006168) z^-1 + 0.8988 (+/- 0.0005557) z^-2

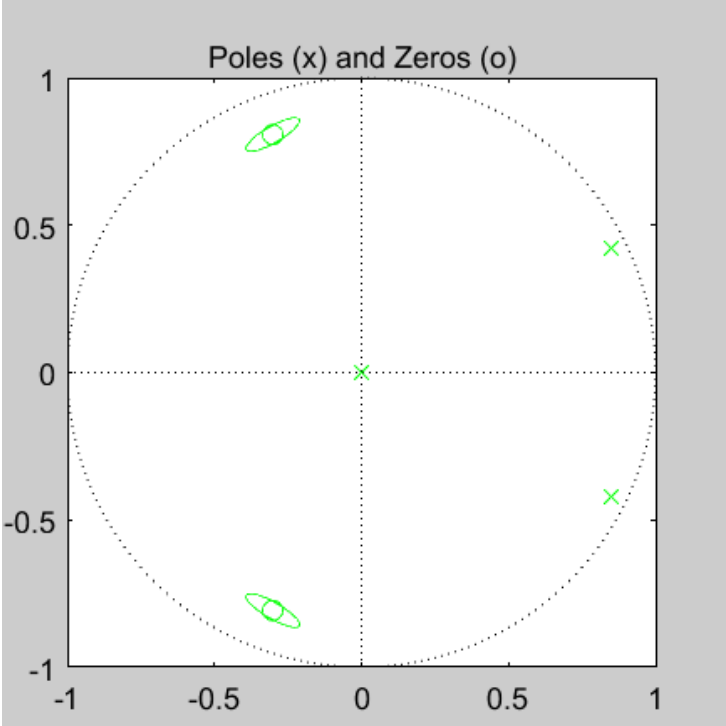
Name: oe323

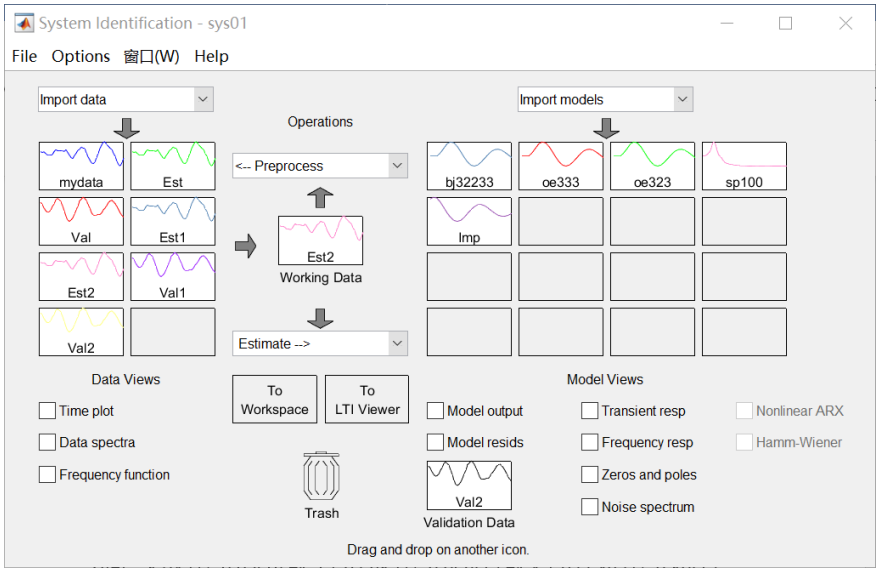
Polynomial Orders: nb=3 nf=2 nk=3

Fit to estimation data: 93.1%

FPE: 0.9434, MSE: 0.93

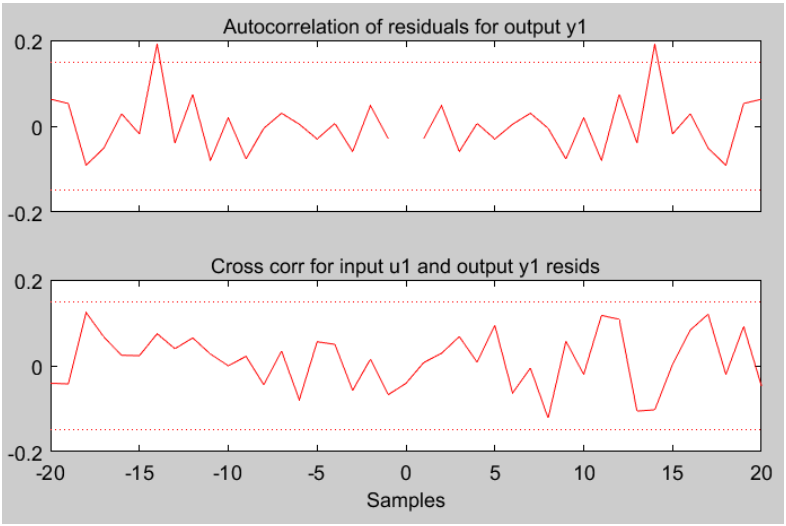


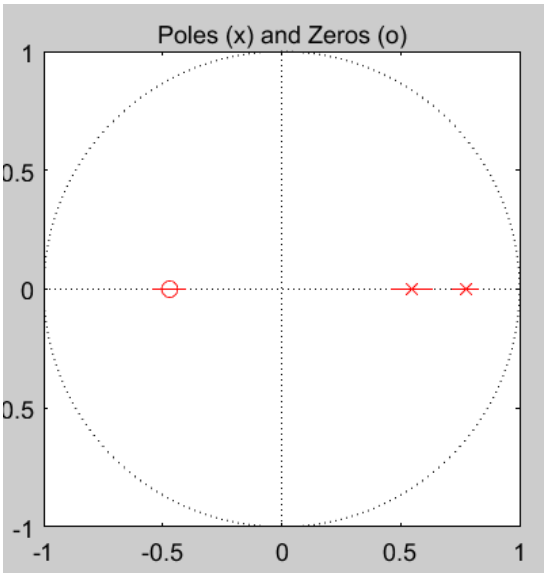


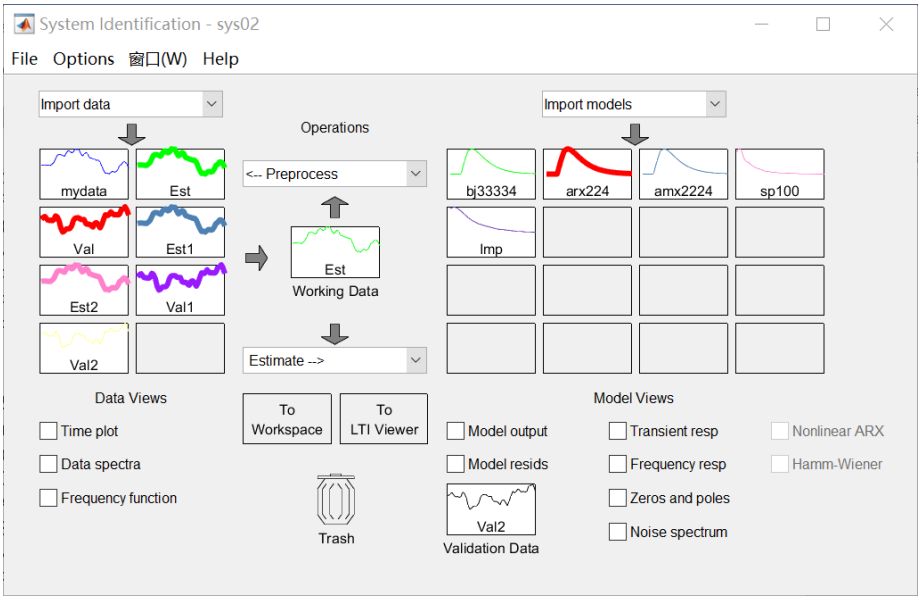


c) The alternative model could be:
oe333 =
Discrete-time OE model: y(t) = [B(z)/F(z)]u(t) + e(t)
B(z) = 1.24 (+/- 0.0369) z^-3 + 0.681 (+/- 0.06856) z^-4 + 0.6648 (+/- 0.1056) z^-5
F(z) = 1 - 1.821 (+/- 0.04367) z^-1 + 1.106 (+/- 0.07432) z^-2 - 0.1094 (+/- 0.03928) z^-3
Name: oe333
Polynomial orders: nb=3 nf=3 nk=3
Fit to estimation data: 93.1%
FPE: 0.9434, MSE: 0.93

2.(u2,y2)
a) The selected model structure: arx224
b) arx224 =
Discrete-time ARX model: A(z)y(t) = B(z)u(t) + e(t)
A(z) = 1 - 1.326 (+/- 0.01737) z^-1 + 0.4265 (+/- 0.01689) z^-2
B(z) = 1.972 (+/- 0.03796) z^-4 + 0.9275 (+/- 0.05068) z^-5
Name: arx224
Polynomial Orders: nb=3 nf=2 nk=3
Fit to estimation data: 89.31% (prediction focus)
FPE: 1.009, MSE: 0.9915







c) The alternative model could be amx 2224

3.(u3,y3)

a) The selected model structure: amx2222

b) amx2222 =

Discrete-time ARMAX model: A(z)y(t) = B(z)u(t) + C(z)e(t)

A(z) = 1 - 1.507 (+/- 0.01223) z^-1 + 0.6971 (+/- 0.01039) z^-2

B(z) = 0.9862 (+/- 0.03881) z^-2 + 0.4697 (+/- 0.05153) z^-3

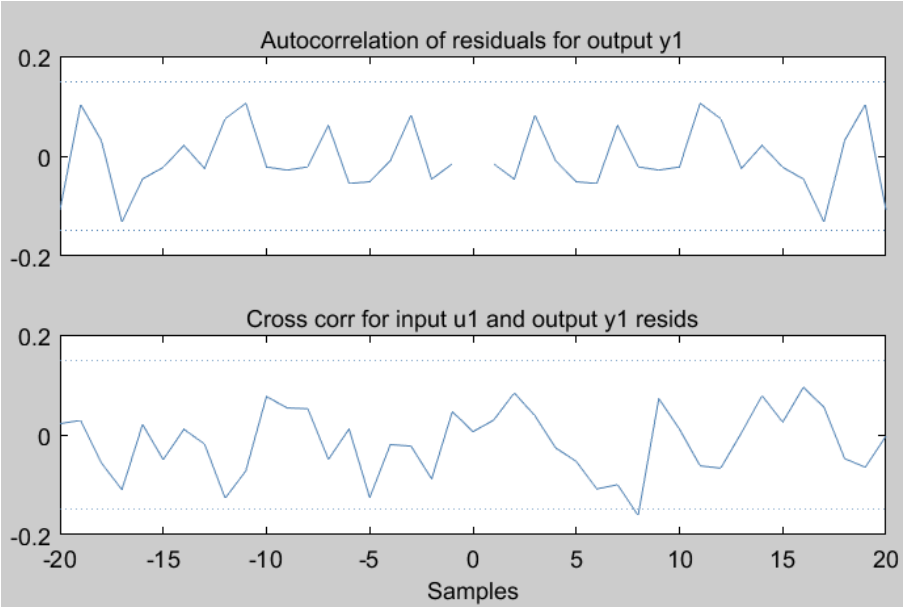
C(z) = 1 - 1.008 (+/- 0.03981) z^-1 + 0.2093 (+/- 0.03877) z^-2

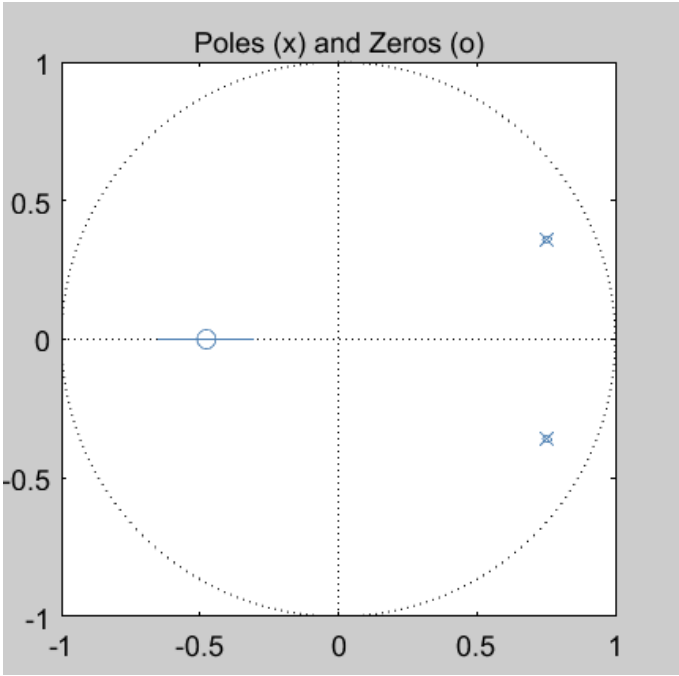
Name: amx2222

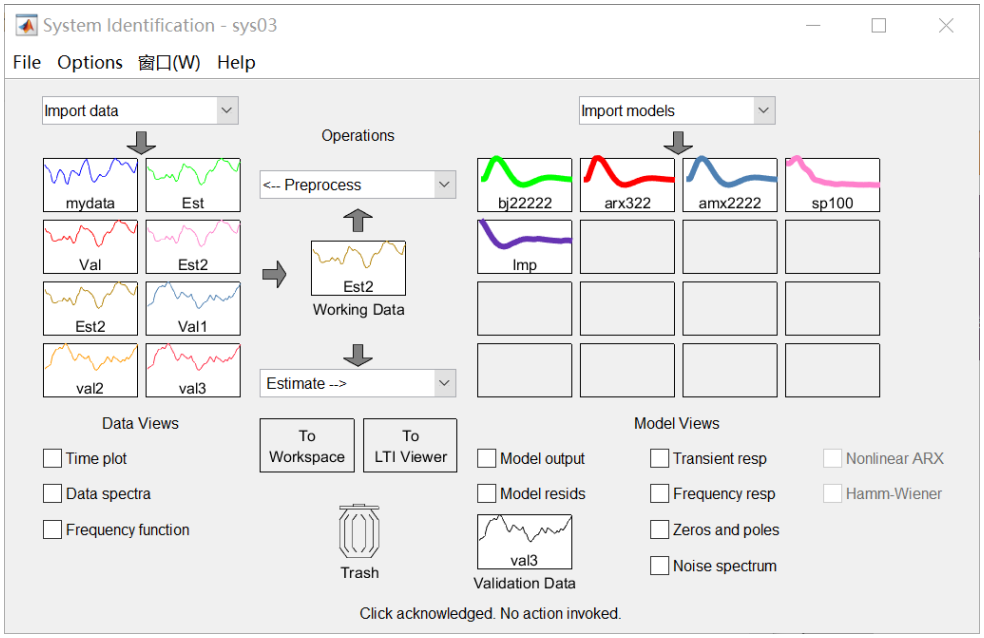
Polynomial Orders: na=2 nb=2 nc=2 nk=2

Fit to estimation data: 76.78% (prediction focus)

FPE: 1.005, MSE: 0.9881







c) The alternative model could be is bj22222

4.(u4,y4)

a) The selected model structure: amx2211

b) amx2211 =

Discrete-time ARMAX model: A(z)y(t) = B(z)u(t) + C(z)e(t)

A(z) = 1 - 1.112 (+/- 0.03271) z^-1 + 0.2905 (+/- 0.02673) z^-2

B(z) = 1.069 (+/- 0.06149) z^-1 + 0.4038 (+/- 0.08782) z^-2

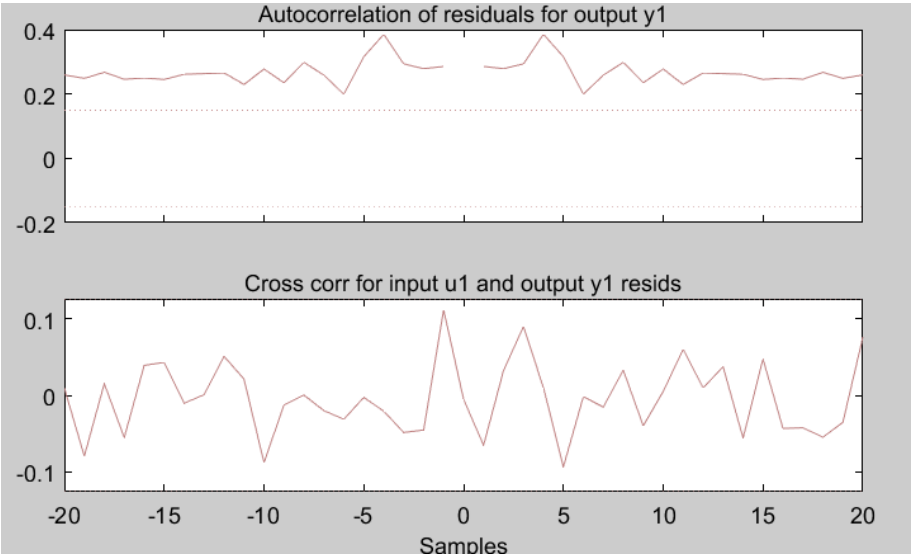
C(z) = 1 - 0.9897 (+/- 0.005488) z^-1

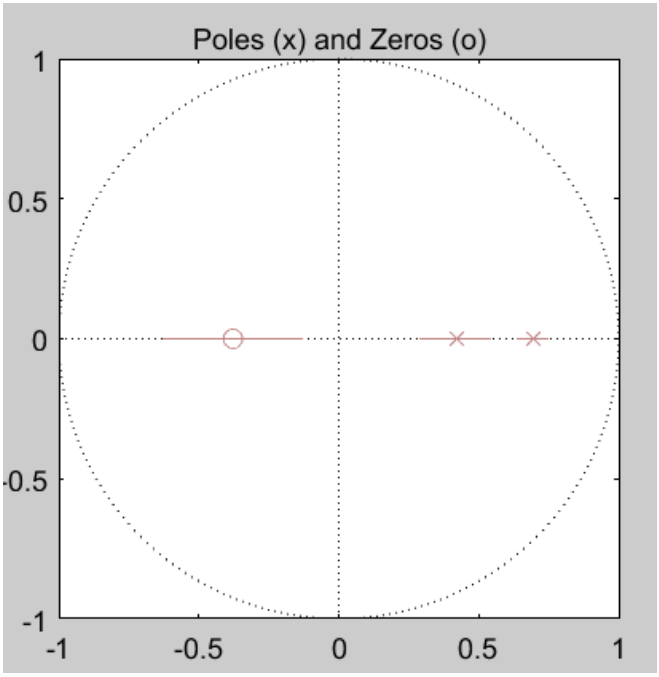
Name: amx2211

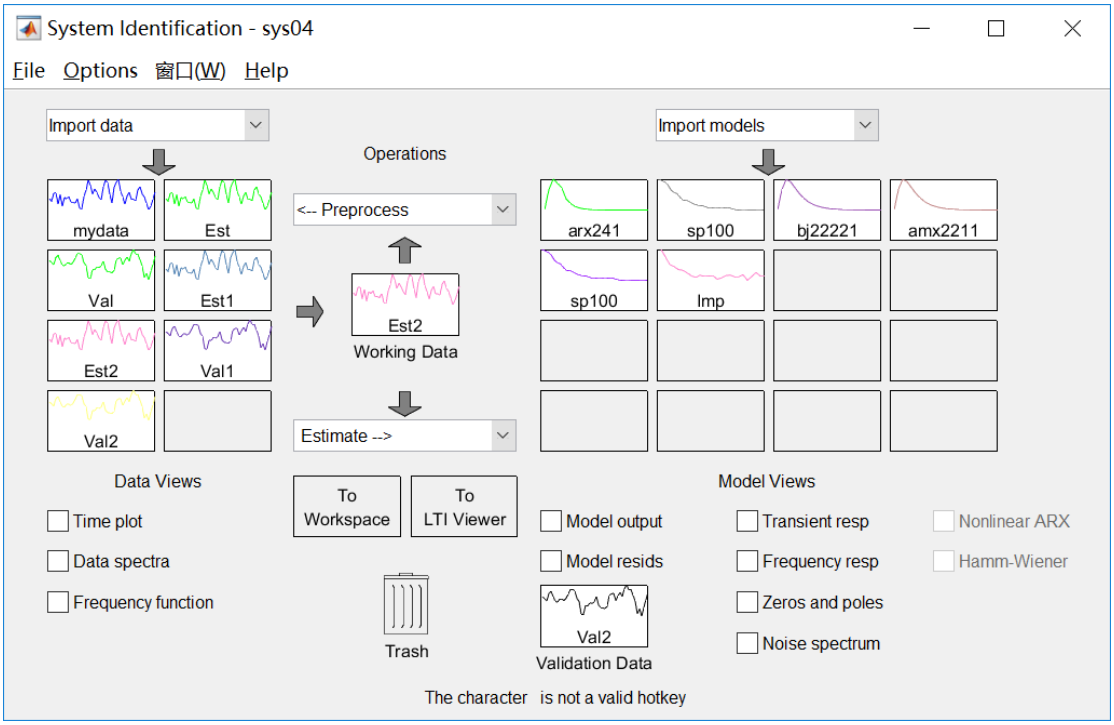
Polynomial Orders: na=2 nb=2 nc=1 nk=1

Fit to estimation data: 50.07% (prediction focus)

FPE: 2.617, MSE: 2.58







c) No alternative models

5. (u5,y5)

a) The selected model structure: bj11221

b) bj11221 =

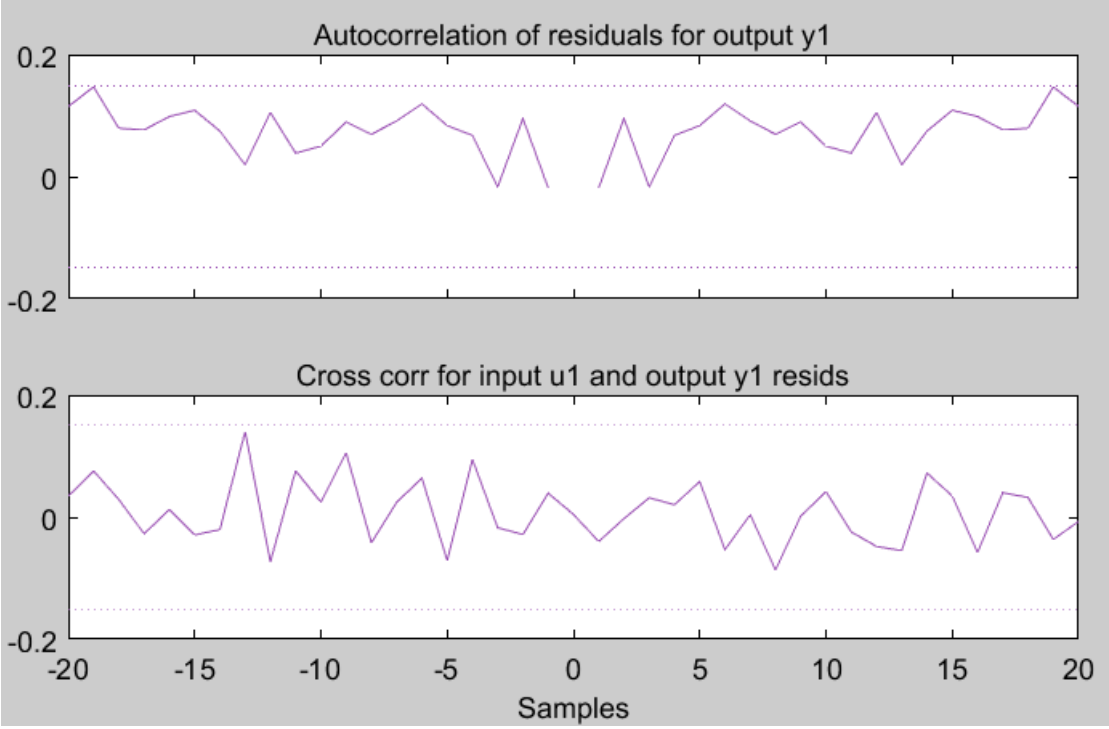
Discrete-time BJ model: y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)

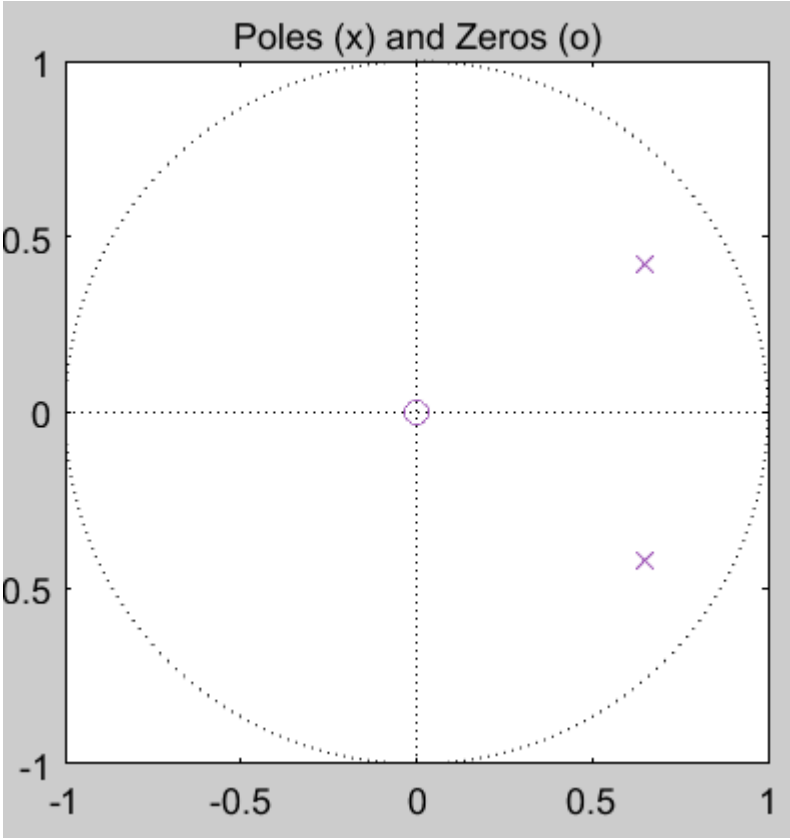
B(z) = 1.304 (+/- 0.005434) z^-1

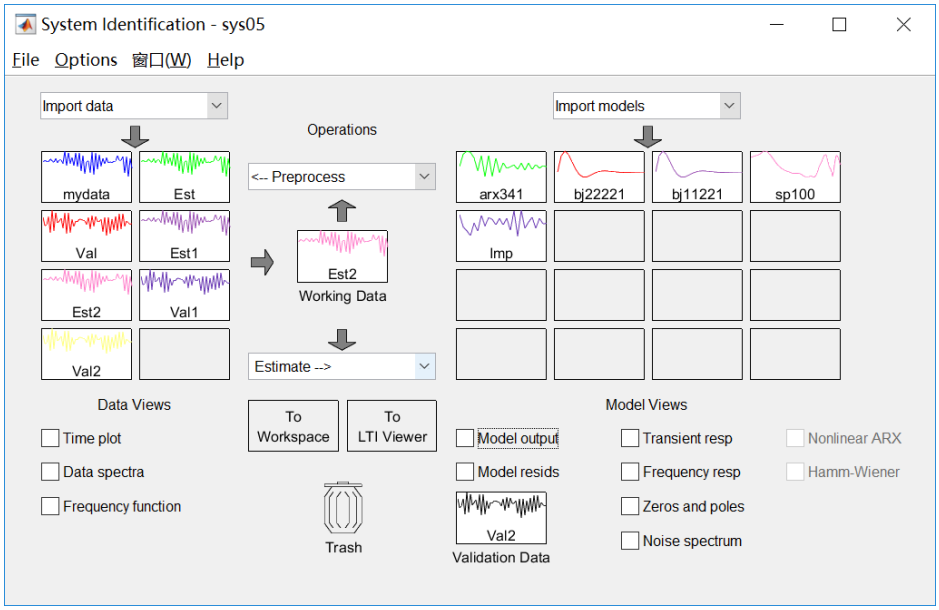
C(z) = 1 - 0.7385 (+/- 0.02653) z^-1

D(z) = 1 + 1.685 (+/- 0.02434) z^-1 + 0.7881 (+/- 0.02434) z^-2

F(z) = 1 - 1.295 (+/- 0.002506) z^-1 + 0.5959 (+/- 0.002065) z^-2
Polynomial Orders: na=1 nb=1 nc=2 nd=2 nk=1
Fit to estimation data: 88.36% (prediction focus)
FPE: 1.565, MSE: 1.538







c) The alternative model for the data could be bj22221