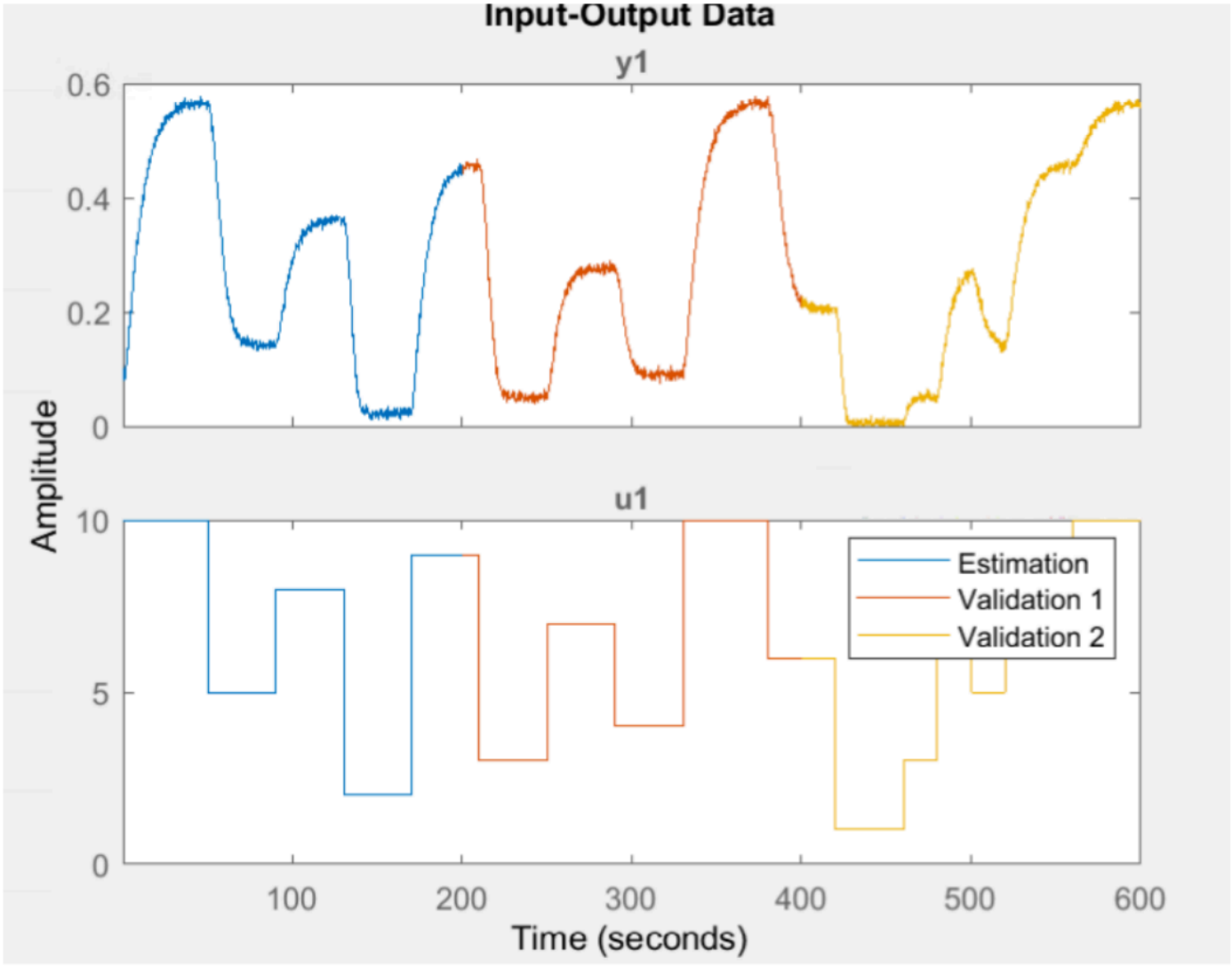
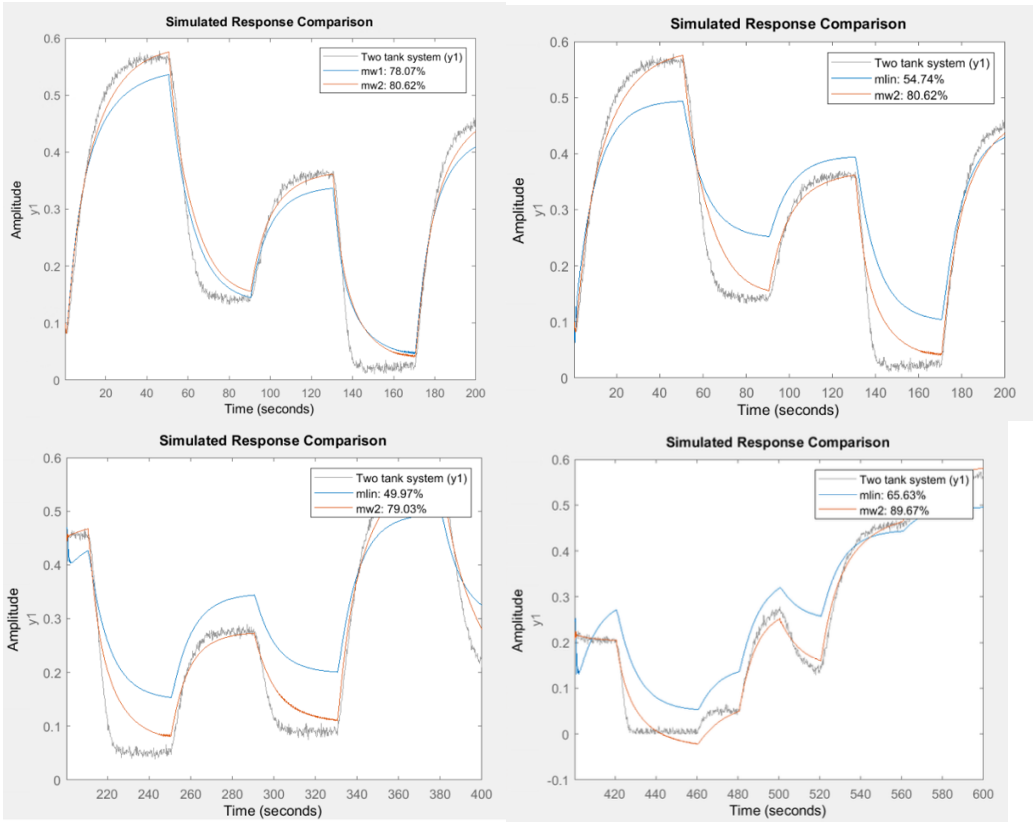
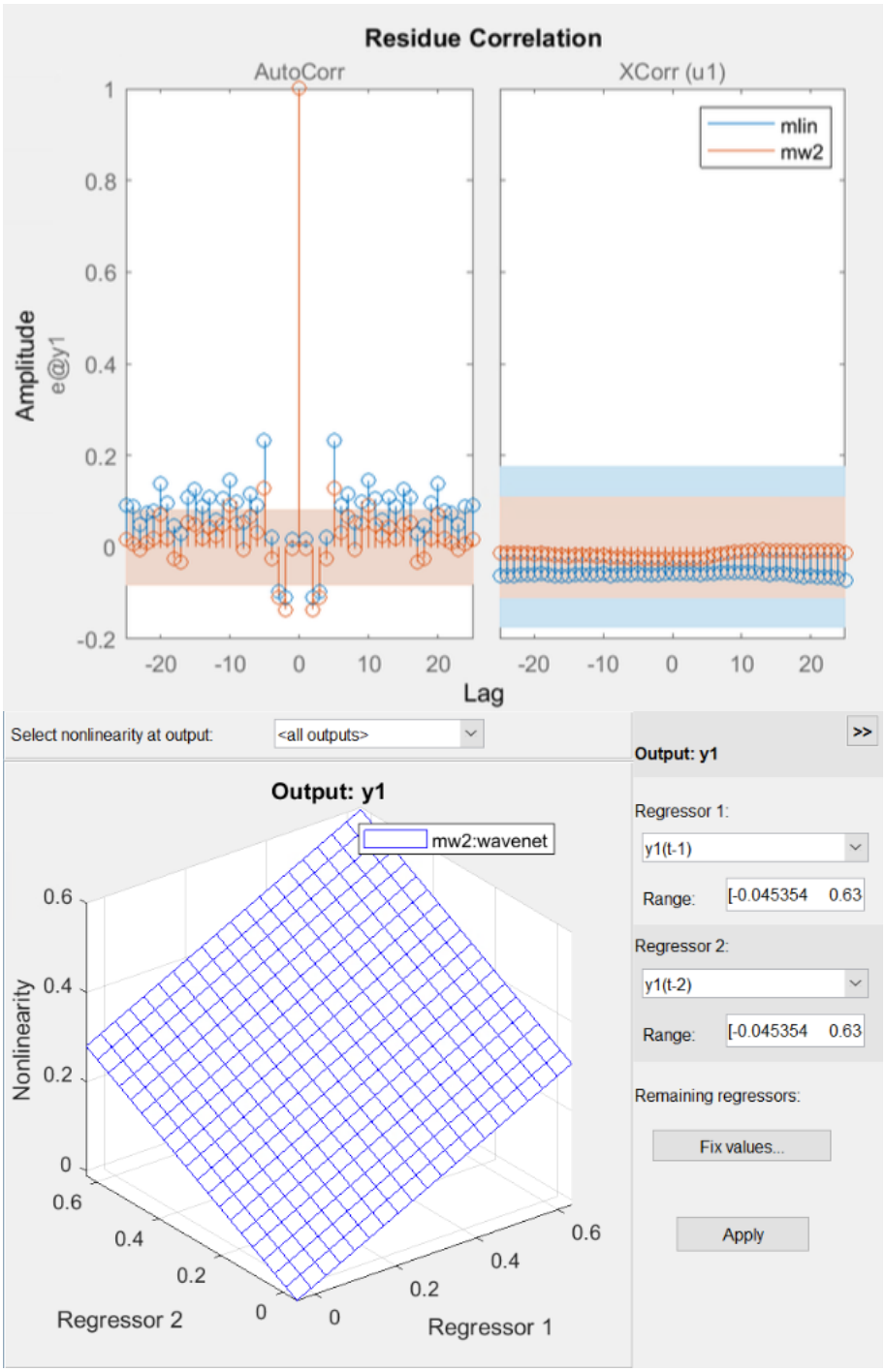
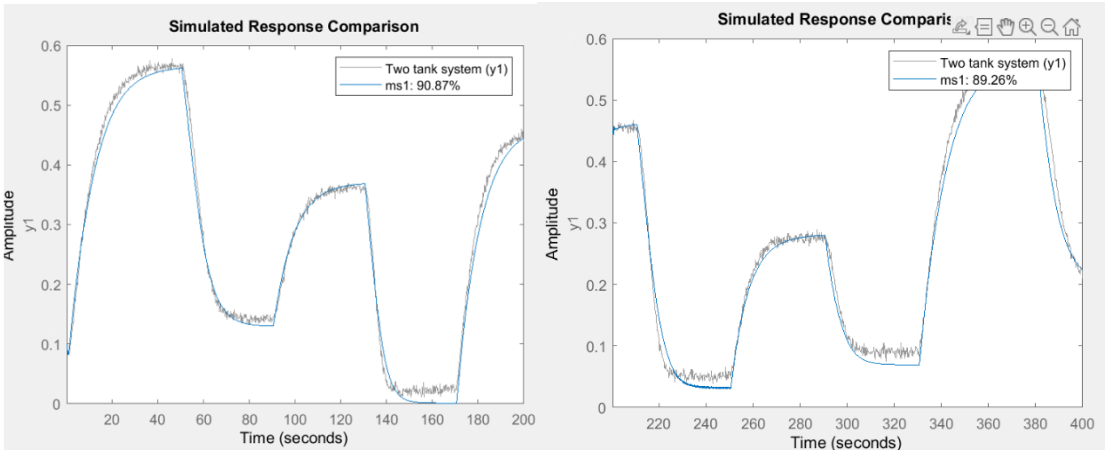

Input-Output Data
y1
0.6
0.4
0.2
0
Amplitude
u1
10
5
0
Estimation
Validation 1
Validation 2
100
200
300
400
500
600
Time (seconds)

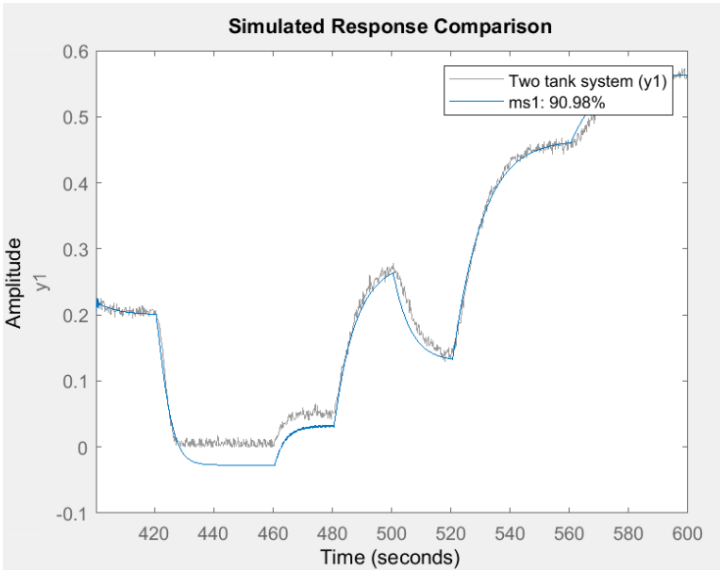


The top left: comparison of z1, mw1 and mw2, top right: comparison of z1, mlin and mw2, under left: comparison of z2, mlin and mw2, under right: comparison of z3, mlin and mw2.

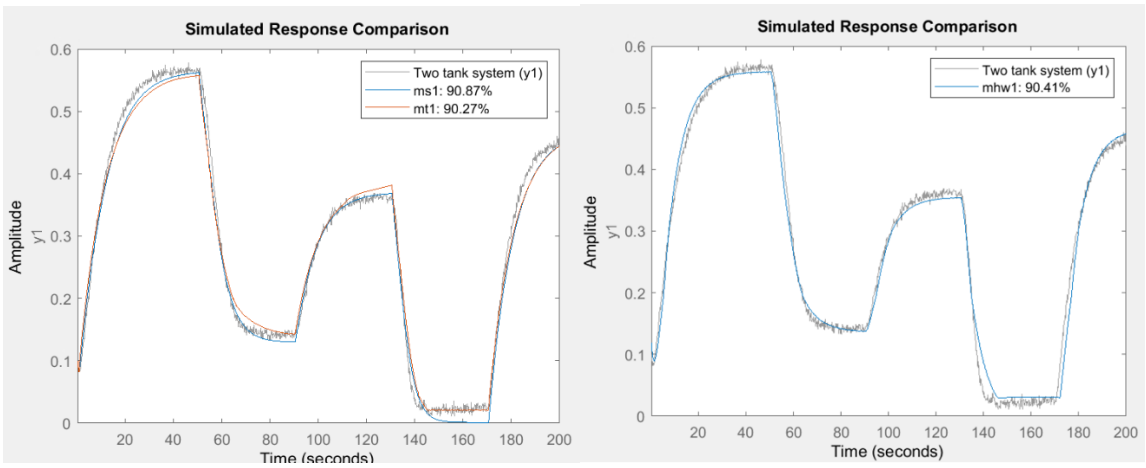

Residue Correlation
AutoCorr
XCorr (u1)
mlin
mw2
Amplitude
e@y1
Lag
Select nonlinearity at output:
<all outputs>
>>
Output: y1
Output: y1
mw2:wavenet
Nonlinearity
Regressor 2
Regressor 1
Regressor 1:
y1(t-1)
Range:
[-0.045354 0.63
Regressor 2:
y1(t-2)
Range:
[-0.045354 0.63
Remaining regressors:
Fix values...
Apply



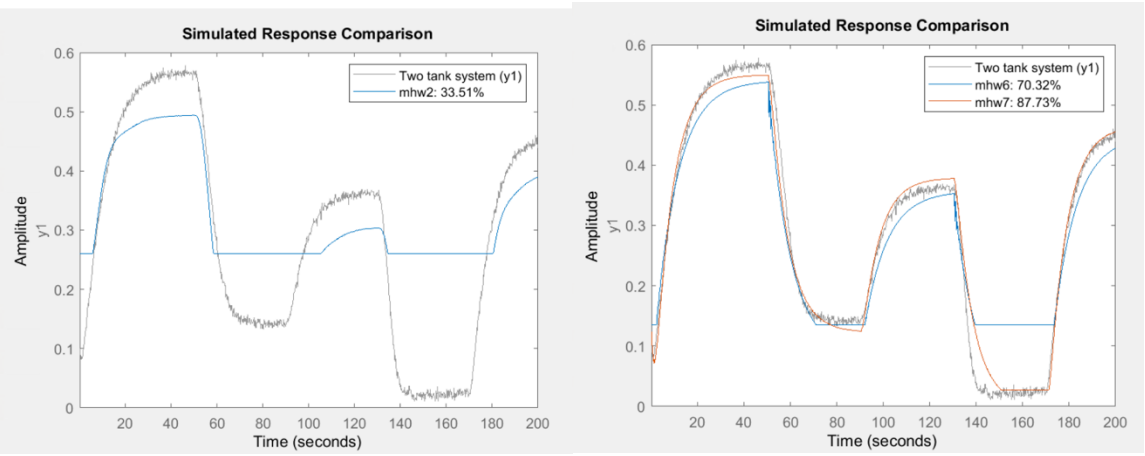
Left: comparison of ms1 and z1, right: comparison og ms1 and z2



Comparison of ms1 and z3

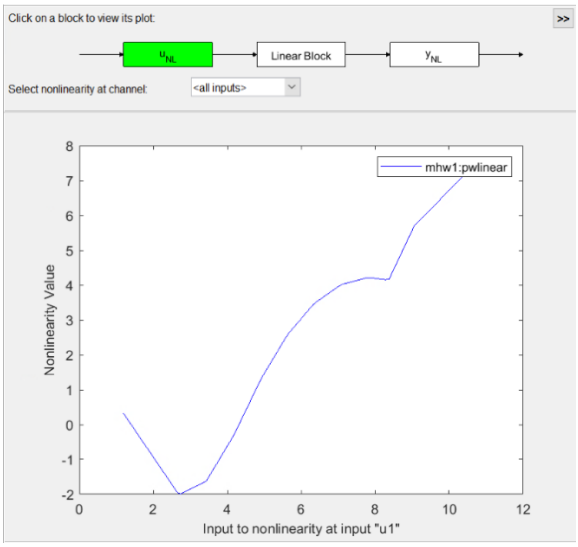


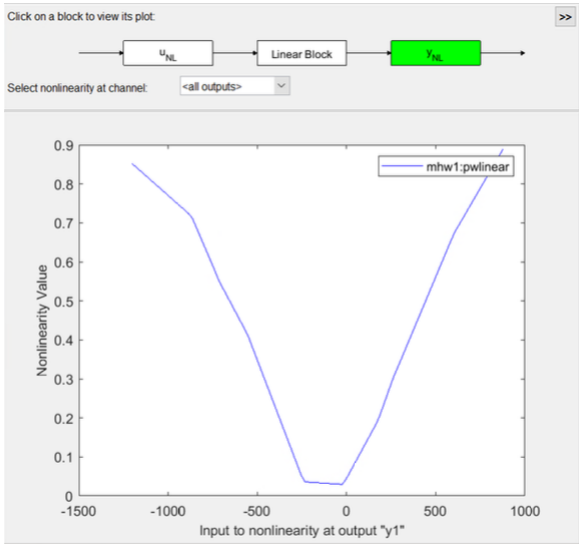
Left: comparison of ms1, mt1 and z1, right: comparison of mhw1 and z1

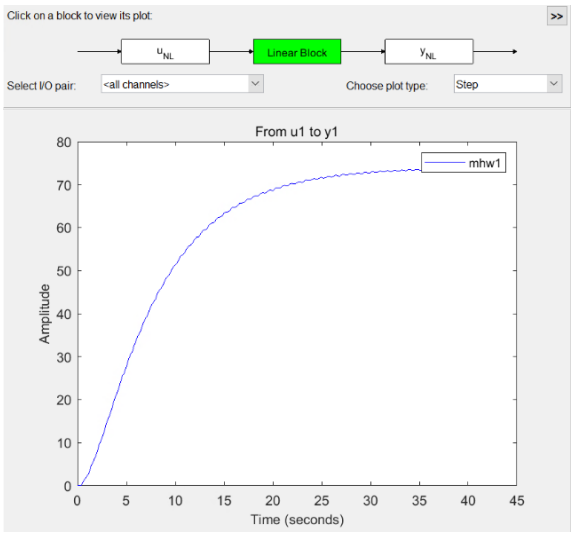


Left: comparing mhw2 and z1, right: comparing mhw6, mhw7 and z1.

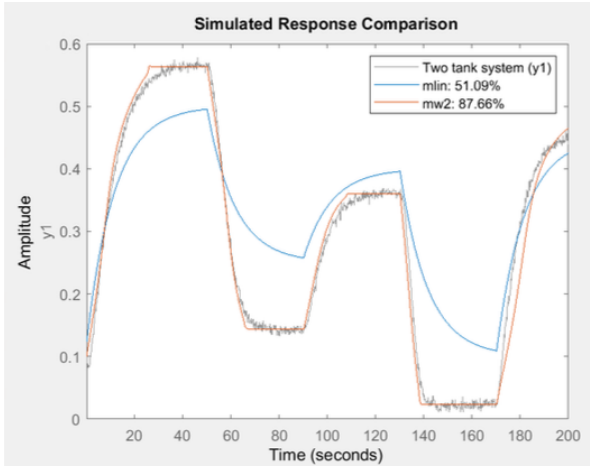
Hammerstein-Wiener:

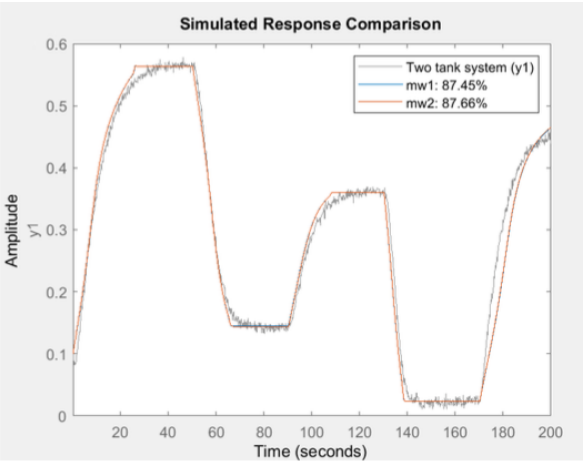


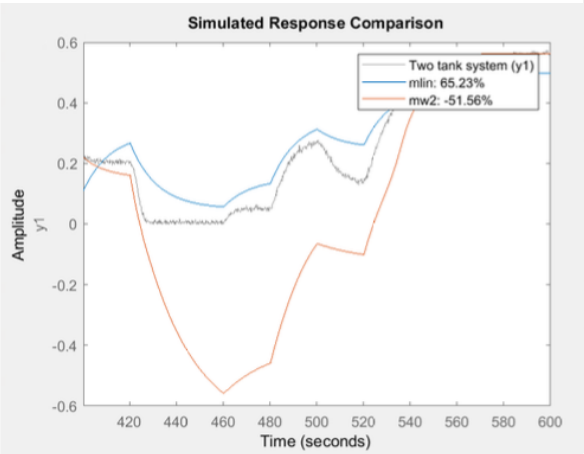


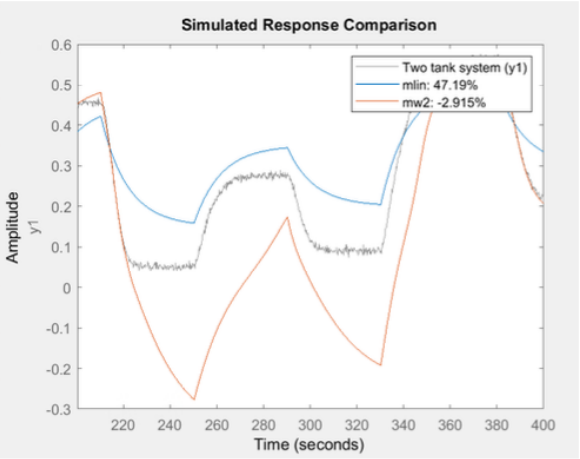


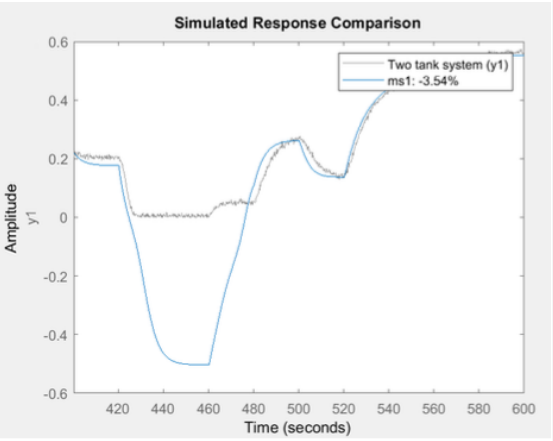
10.3: The complexity of the model is now reduced as described in the assignment text on BB.

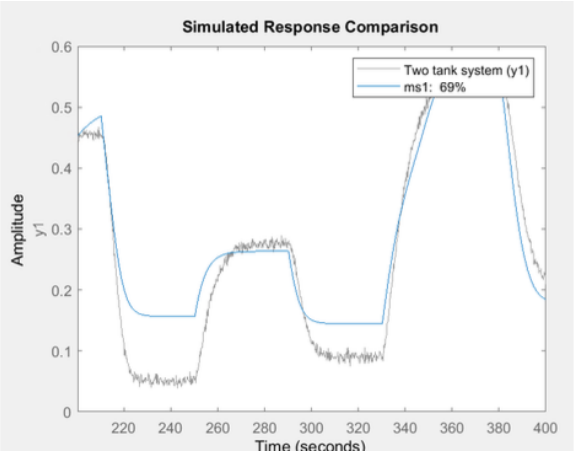


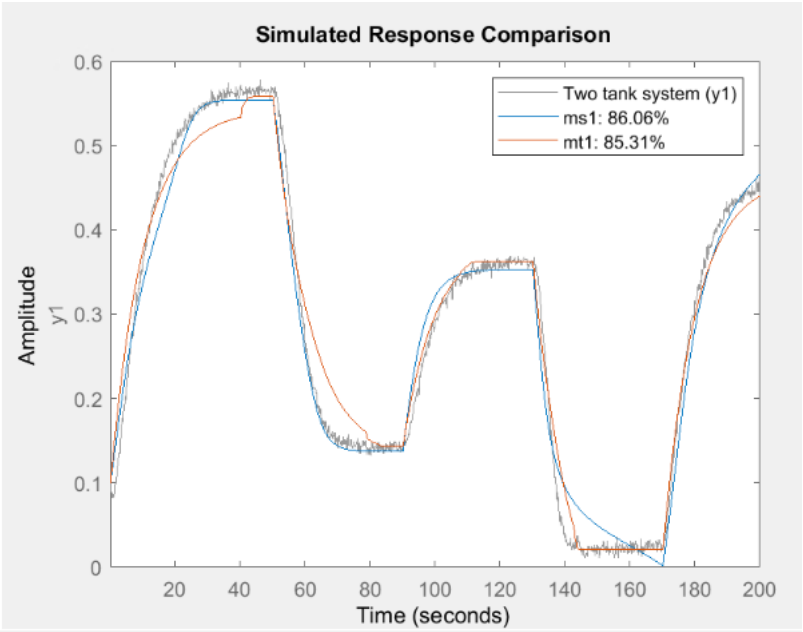


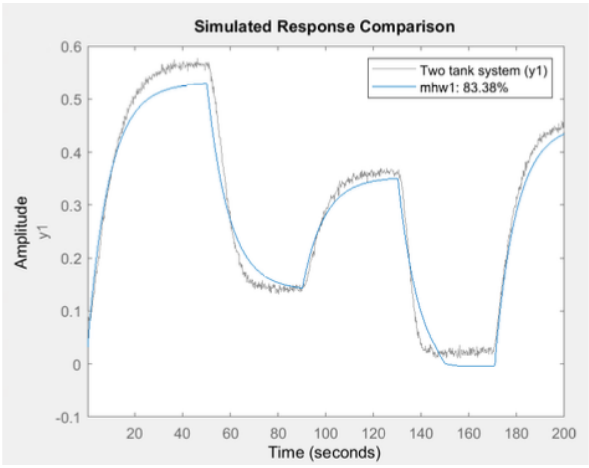

Simulated Response Comparison
Two tank system (y1)
mlin: 65.23%
mw2: -51.56%
Amplitude
y1
Time (seconds)

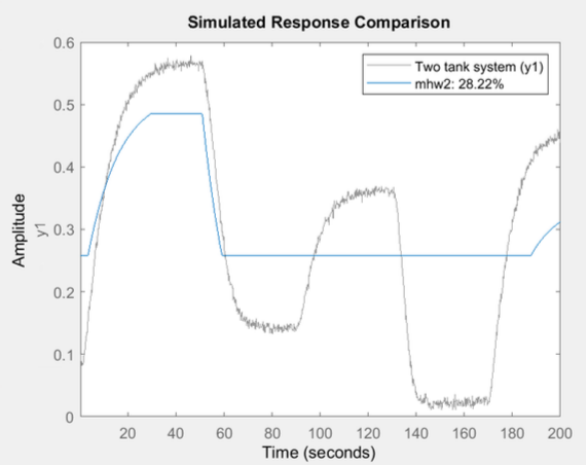

Simulated Response Comparison
Two tank system (y1)
mlin: 47.19%
mw2: -2.915%
Amplitude
y1
Time (seconds)

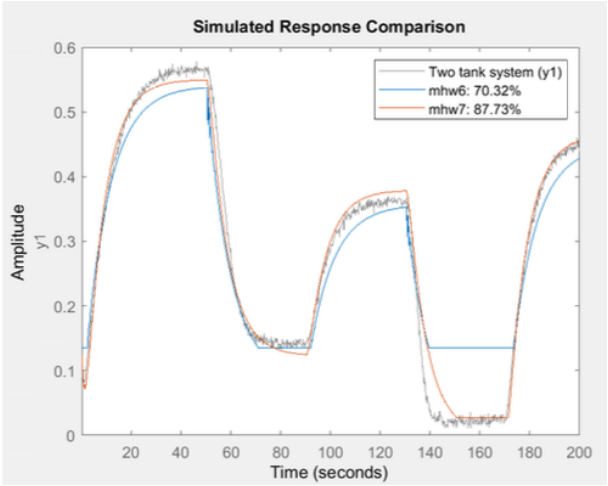

Simulated Response Comparison
Two tank system (y1)
ms1: -3.54%
Amplitude
y1
Time (seconds)


Simulated Response Comparison
Two tank system (y1)
ms1: 69%
Amplitude
y1
Time (seconds)


Simulated Response Comparison
Two tank system (y1)
ms1: 86.06%
mt1: 85.31%
Amplitude
y1
Time (seconds)





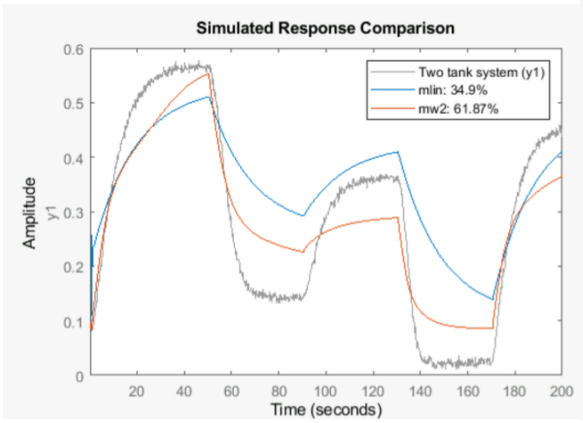


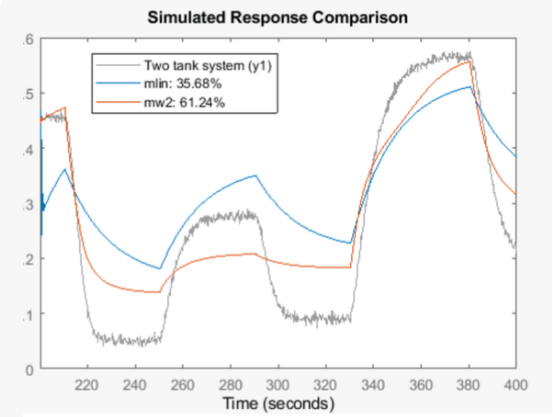
By using the regressors selection nn = {1,1,1} and retuning some of the values one can see that the effects are:

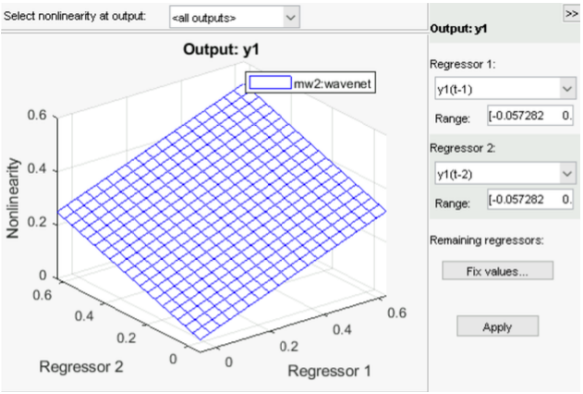
- Not the best results for mwh2 and mlin for higher complexity models, this is due to the simplification of the model
- The rest of the estimators seem to estimate the true response quite well, despite of the simplifications.
- The Hammerstein Wiener model seems more robust to the simplification of the model

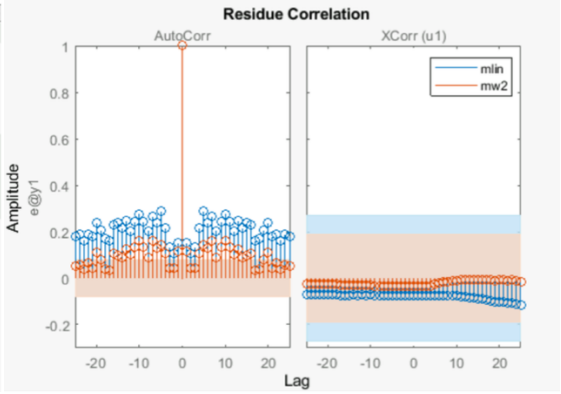
10.4: Back to nn = {5,1,3}, using z3 as training and z1 as validation2, what happens?

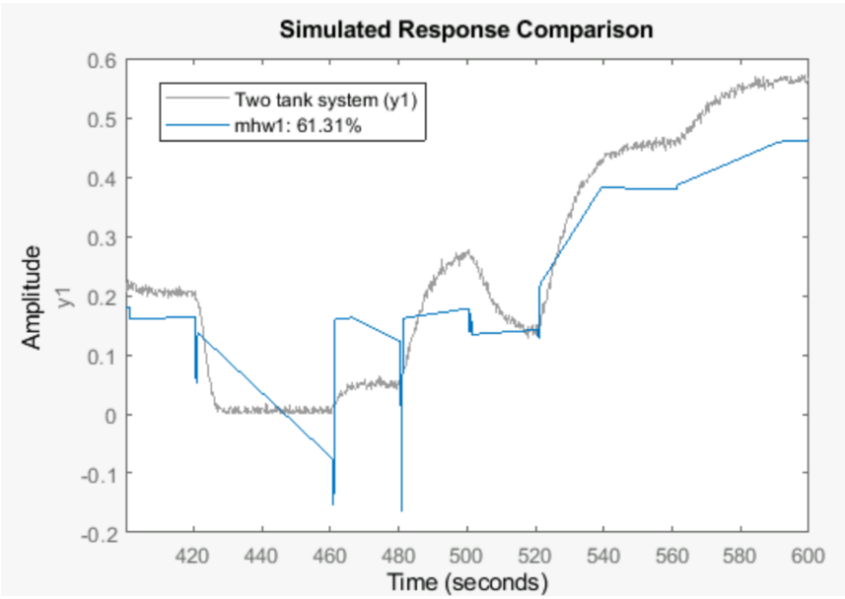
The plots below shows that the performance of the system implemented in 10.2 performs better than the system in this assignment. This could be due to the estimation scheme not being as similar to the validation scheme, and thus the performance is not as good.

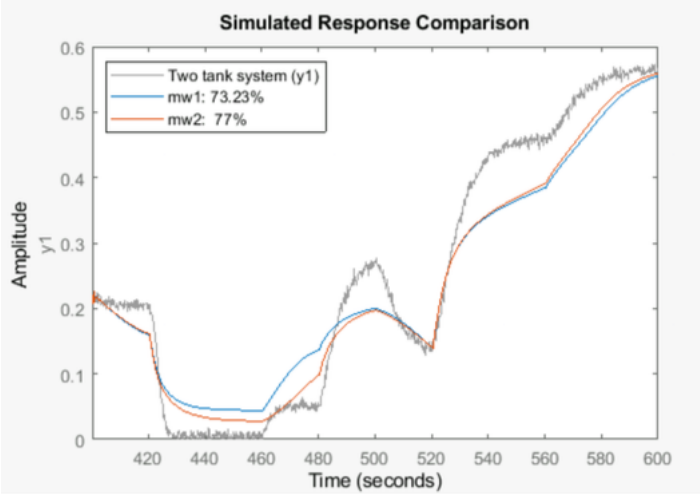

Simulated Response Comparison
Two tank system (y1)
mlin: 34.9%
mw2: 61.87%
Amplitude
y1
Time (seconds)

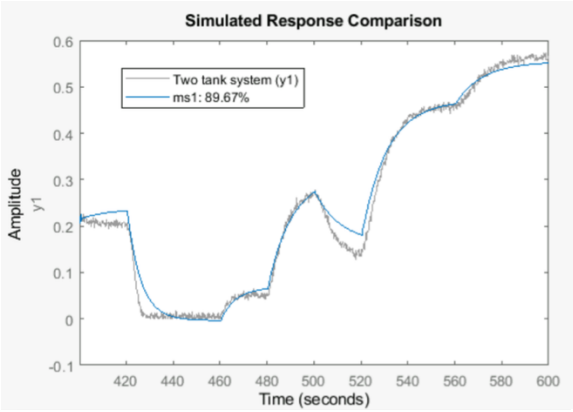

Simulated Response Comparison
Two tank system (y1)
mlin: 35.68%
mw2: 61.24%
Time (seconds)

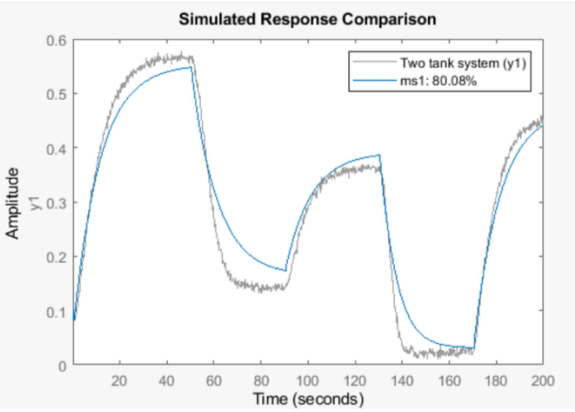

Select nonlinearity at output:
<all outputs>
Output: y1
mw2:wavenet
Nonlinearity
Regressor 2
Regressor 1
Output: y1
Regressor 1:
y1(t-1)
Range:
[-0.057282 0.
Regressor 2:
y1(t-2)
Range:
[-0.057282 0.
Remaining regressors:
Fix values...
Apply

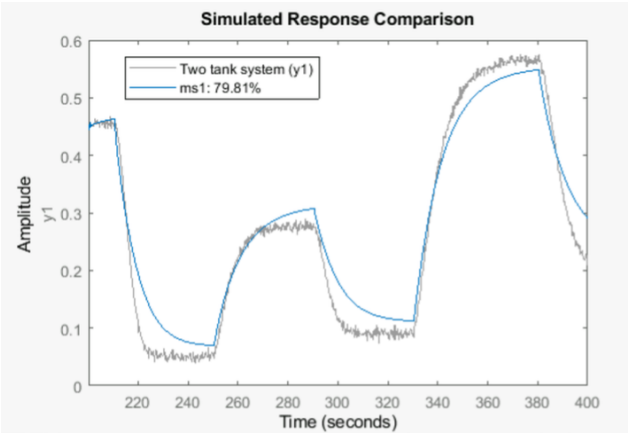

Residue Correlation
AutoCorr
XCorr (u1)
mlin
mw2
Amplitude
e@y1
Lag

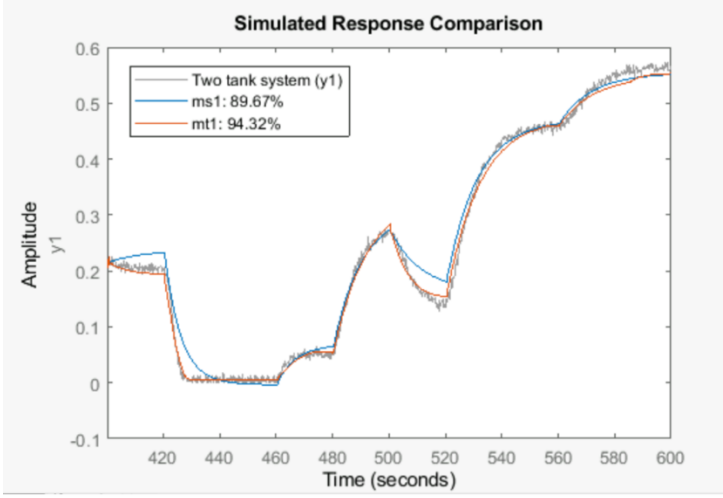

Simulated Response Comparison
Two tank system (y1)
mhw1: 61.31%
Amplitude
y1
Time (seconds)

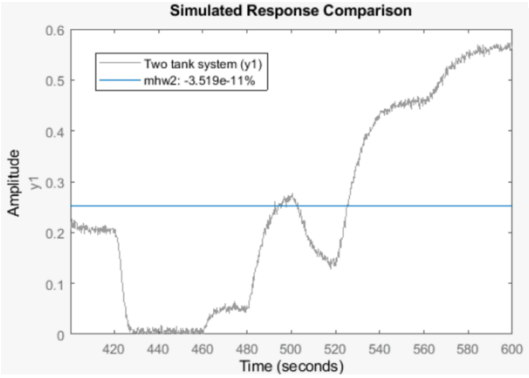

Simulated Response Comparison
Two tank system (y1)
mw1: 73.23%
mw2: 77%
Amplitude
y1
Time (seconds)

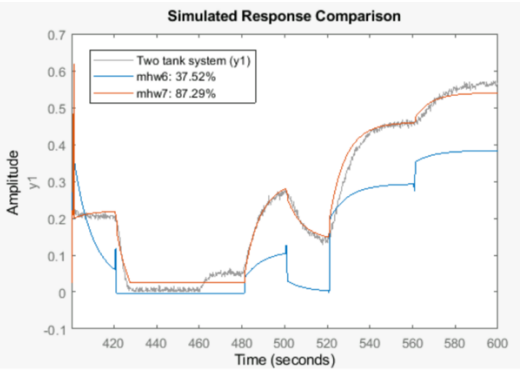

Simulated Response Comparison
Two tank system (y1)
ms1: 89.67%
Amplitude
y1
Time (seconds)

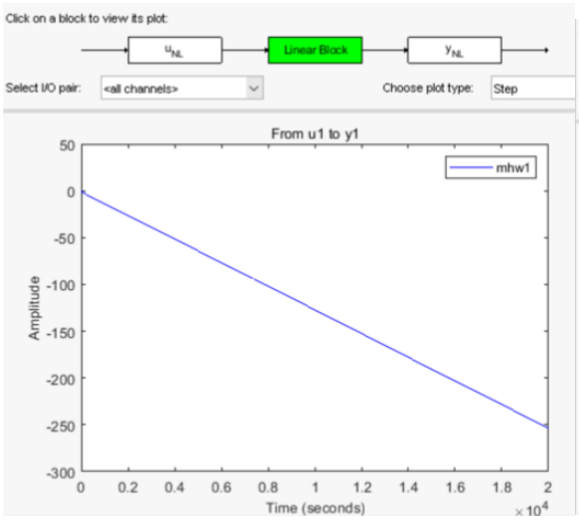

Simulated Response Comparison
Two tank system (y1)
ms1: 80.08%
Amplitude
y1
Time (seconds)

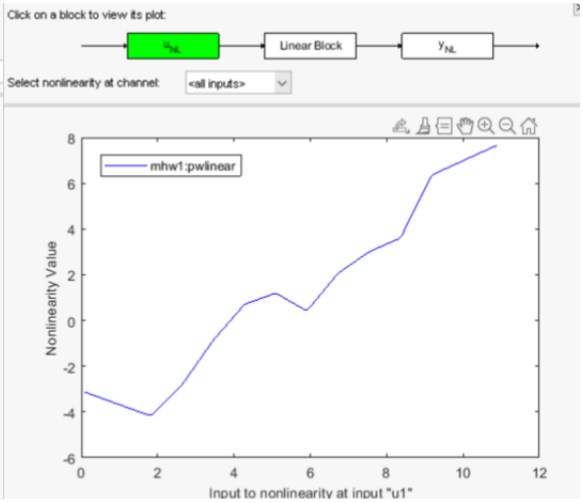

Simulated Response Comparison
Two tank system (y1)
ms1: 79.81%
Amplitude
y1
Time (seconds)

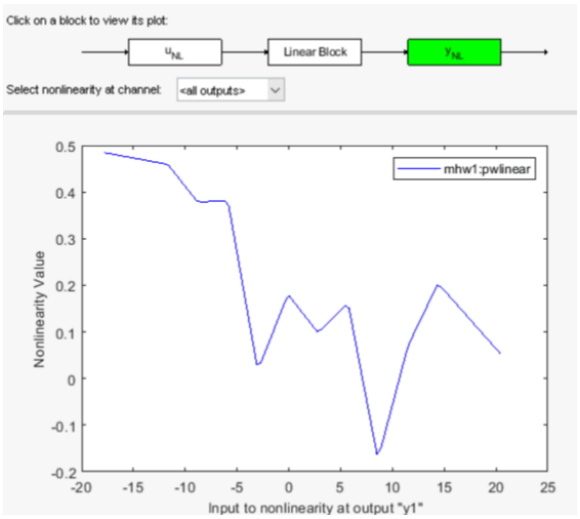

Simulated Response Comparison
Two tank system (y1)
ms1: 89.67%
mt1: 94.32%
Amplitude
y1
Time (seconds)


Simulated Response Comparison
Two tank system (y1)
mhw2: -3.519e-11%
Amplitude
y1
Time (seconds)


Simulated Response Comparison
Two tank system (y1)
mhw6: 37.52%
mhw7: 87.29%
Amplitude
y1
Time (seconds)


Click on a block to view its plot:
Linear Block
Select I/O pair:
<all channels>
Choose plot type:
Step
From u1 to y1
mhw1
Amplitude
Time (seconds)


Click on a block to view its plot:
Linear Block
Select nonlinearity at channel:
<all inputs>
mhw1:pwlinear
Nonlinearity Value
Input to nonlinearity at input "u1"


Click on a block to view its plot:
u_{NL}
Linear Block
y_{NL}
Select nonlinearity at channel:
<all outputs>
mhw1:pwlinear
Nonlinearity Value
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-20
-15
-10
-5
0
5
10
15
20
25
Input to nonlinearity at output "y1"