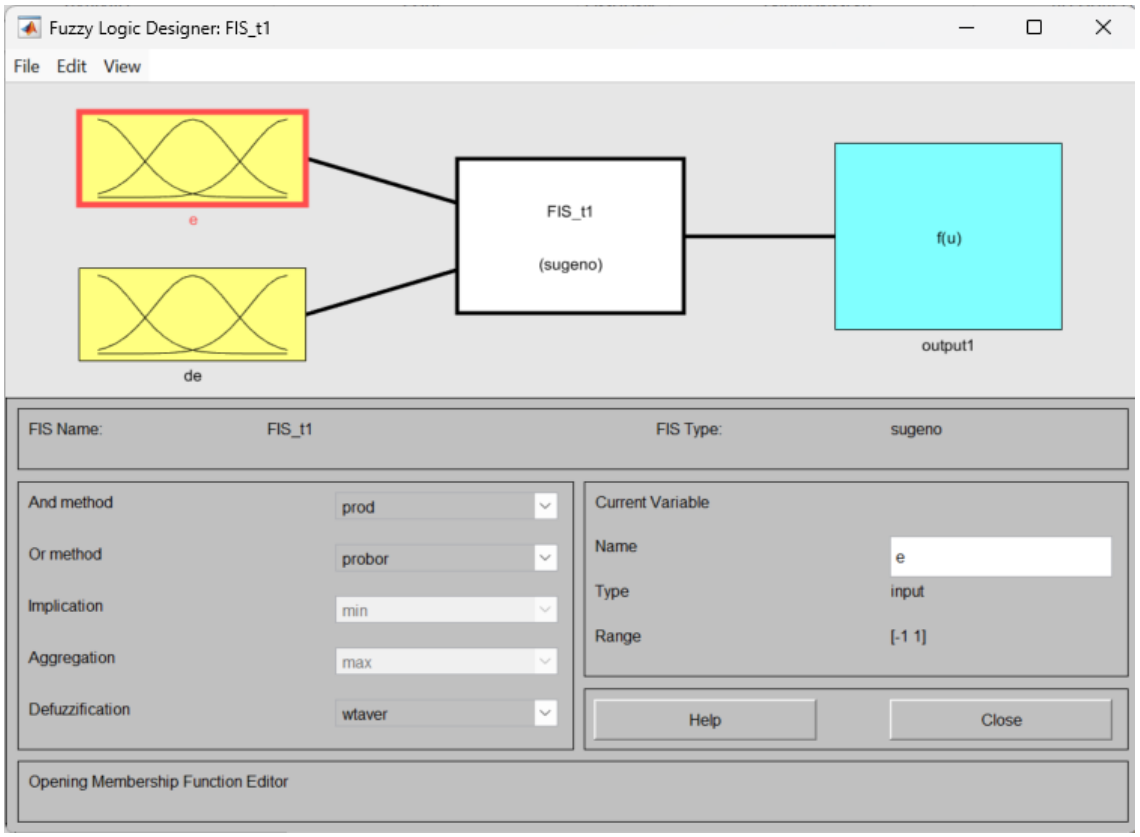
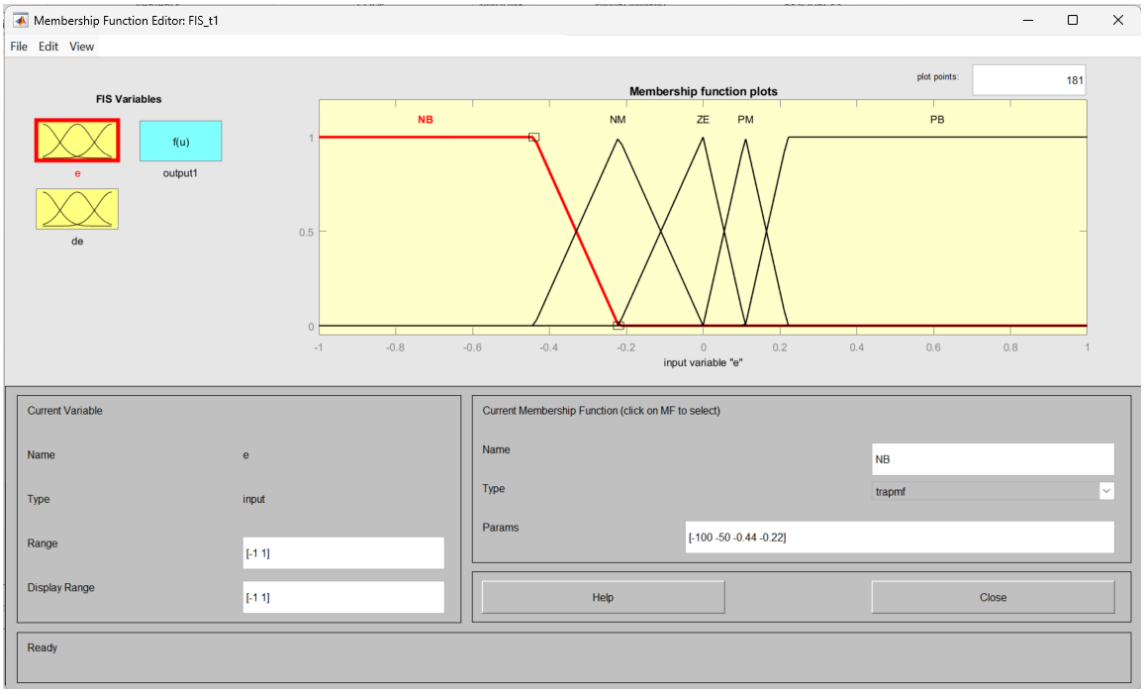
FUZZY logika

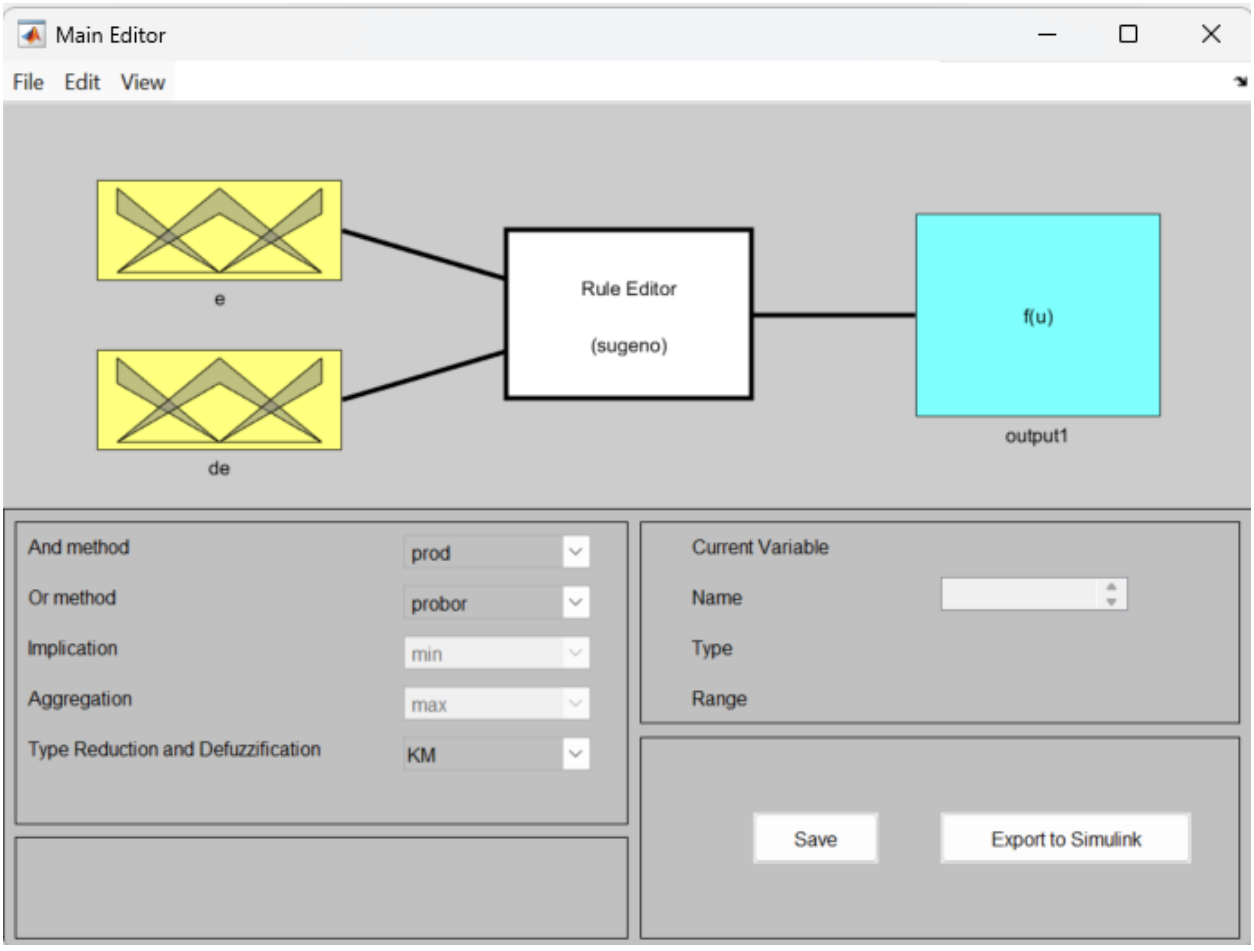
Mladen Ilić E1 28/2023

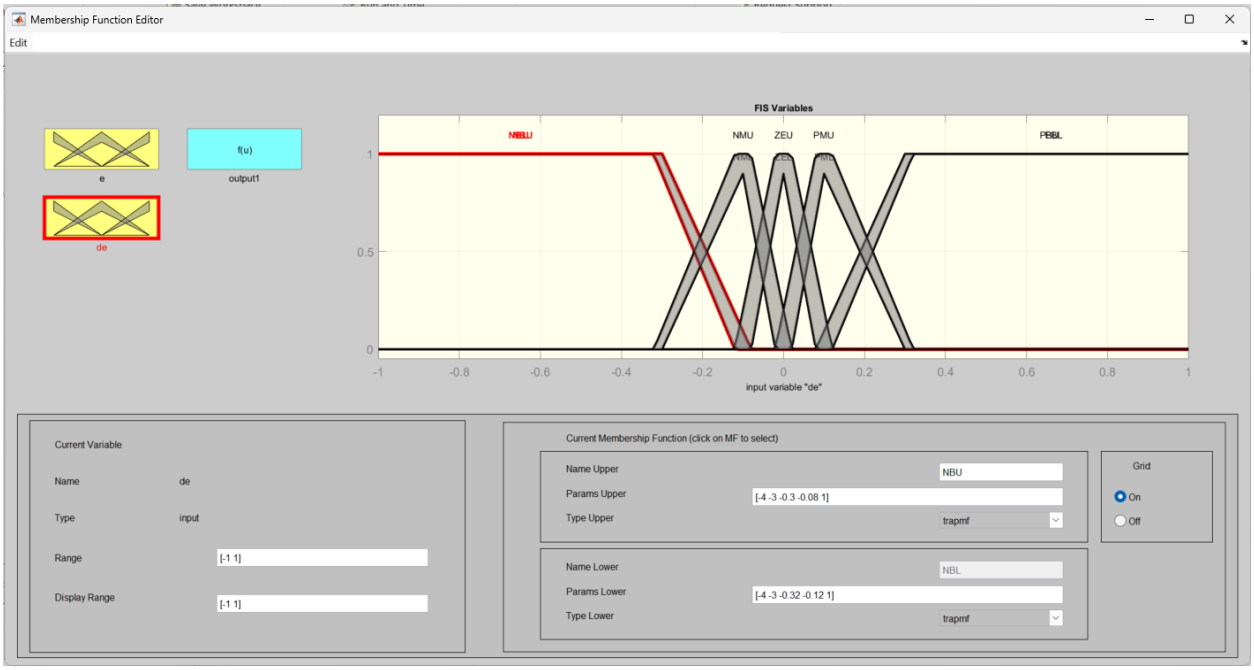
b) Sugeno FIS tipa 1 koji ima dve ulazne fazi varijable koje se zovu „*e*“ (od „error“), i „*de*“ (od „error derivate“, izvod greške po vremenu, ili brzina greške, ili promena greške u vremenu) čije su membership funkcije (MF-je) zadate na slici 1 i slici 2 u tekstu zadatka i jedna izlazna „krisp“ (crisp, oštru, non-fuzzy) izlazna varijabla, i 25 pravila. Pravila su ista i za „*e*“ i za „*de*“.



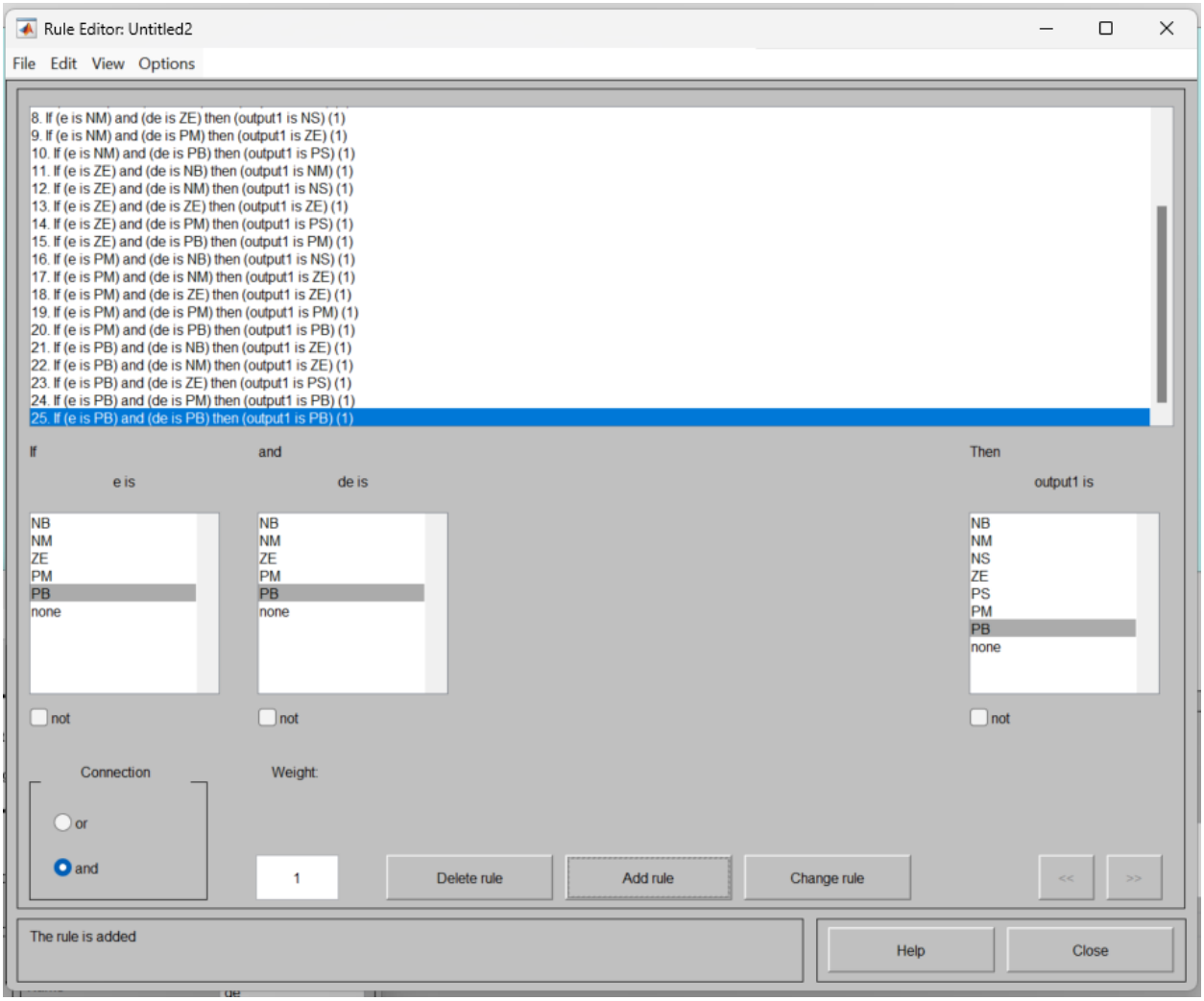


c) Sugeno FIS tipa 2 koji ima dve ulazne fazi varijable koje se zovu „*e*“ i „*de*“, čije su membership funkcije (MF-je) zadate na slici 5 i slici 6 u tekstu zadatka i jedna intervalna izlazna varijabla čije su membership funkcije zadate na slici 7 u tekstu zadatka, i istih 25 pravila kao pod b) (slika 4 u tekstu zadatka).





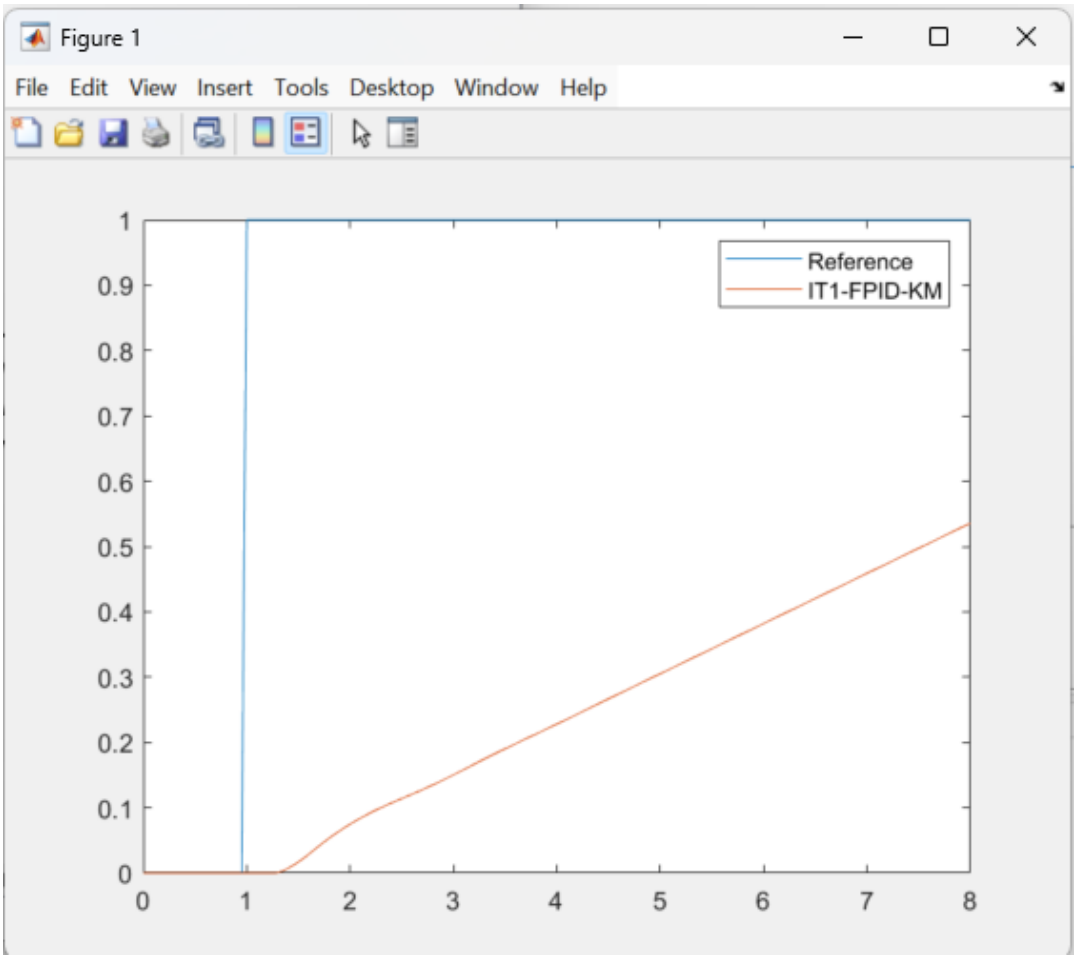
Pravila su ista za oba slučaja.



d) Uvucite dva FIS-a koja ste razvili (FIS Tipa-1 pod b) i FIS Tipa-2 pod c)) u FLC PID kontroler dat u priloženom toolbox-u, nacrtajte grafik kako izlazni signal prati jedinični ulazni (referentni) signal, i uporedite FLC PID kontroler Tipa-1 i Tipa-2.

U folderu Fuzzy_logic se nalaze potrebni fajlovi kako bi se u Matlab-u repliciralno sve što je prikazano na slikama koje se nalaze u nastavku ovog dokumenta.

i) FIS Tipa-1



ii) FIS Tipa-2

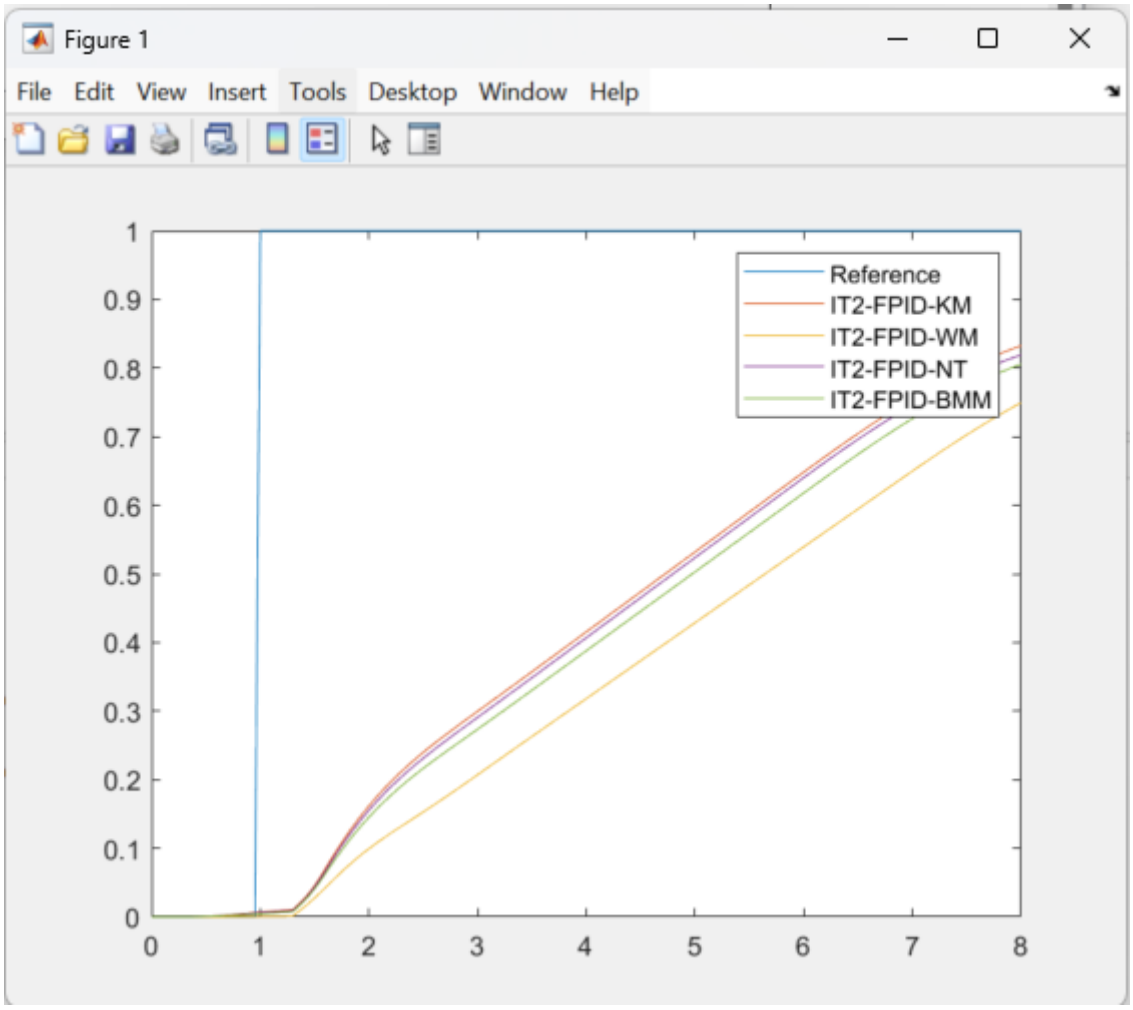
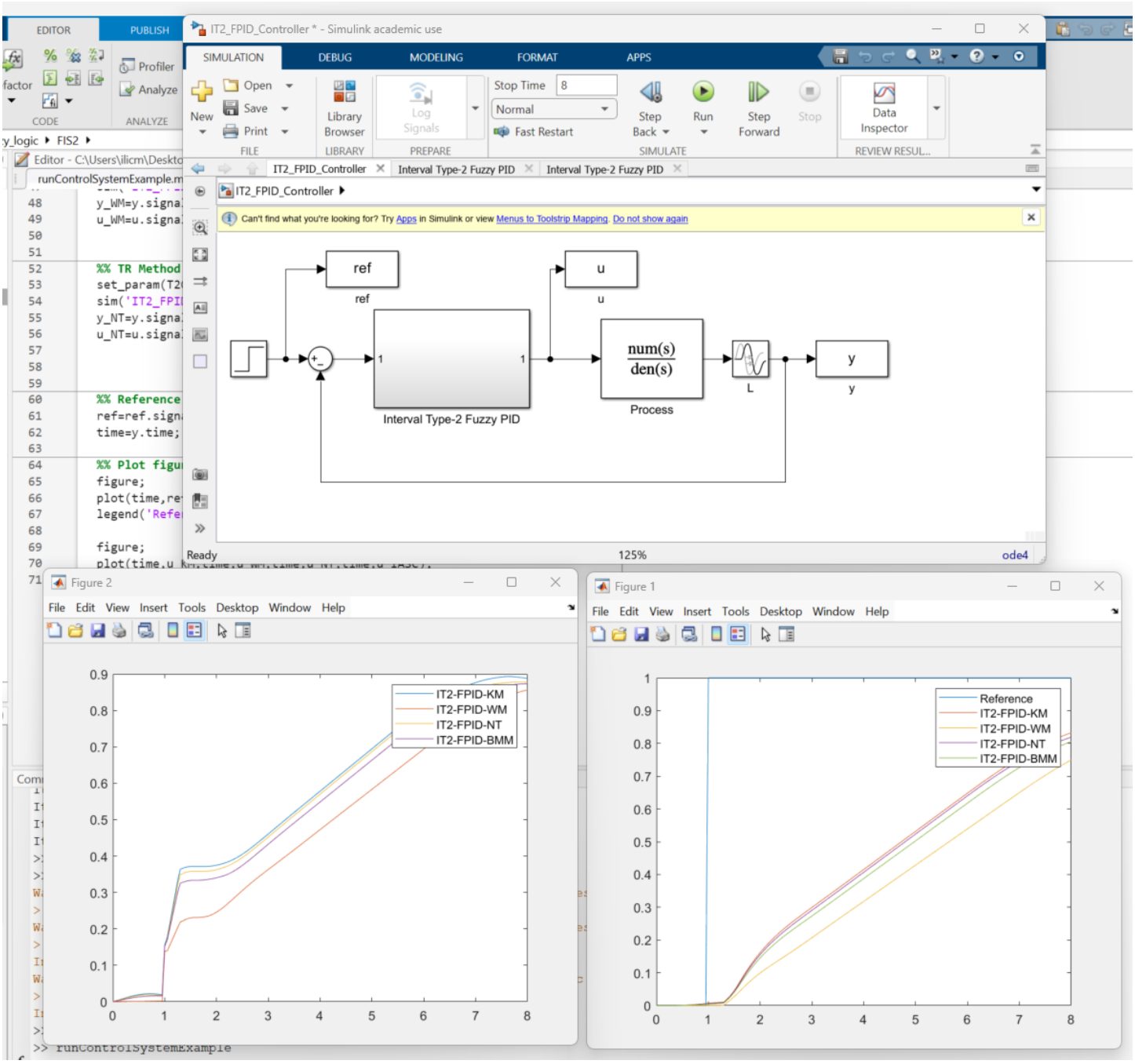


Figure 1
File Edit View Insert Tools Desktop Window Help
Reference
IT2-FPID-KM
IT2-FPID-WM
IT2-FPID-NT
IT2-FPID-BMM
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
1
2
3
4
5
6
7
8

U nastavku se nalaze slike rezultata nakon pokretanja runControlSystemExample.m i runControlSystemExample_FIS1.m fajlova.



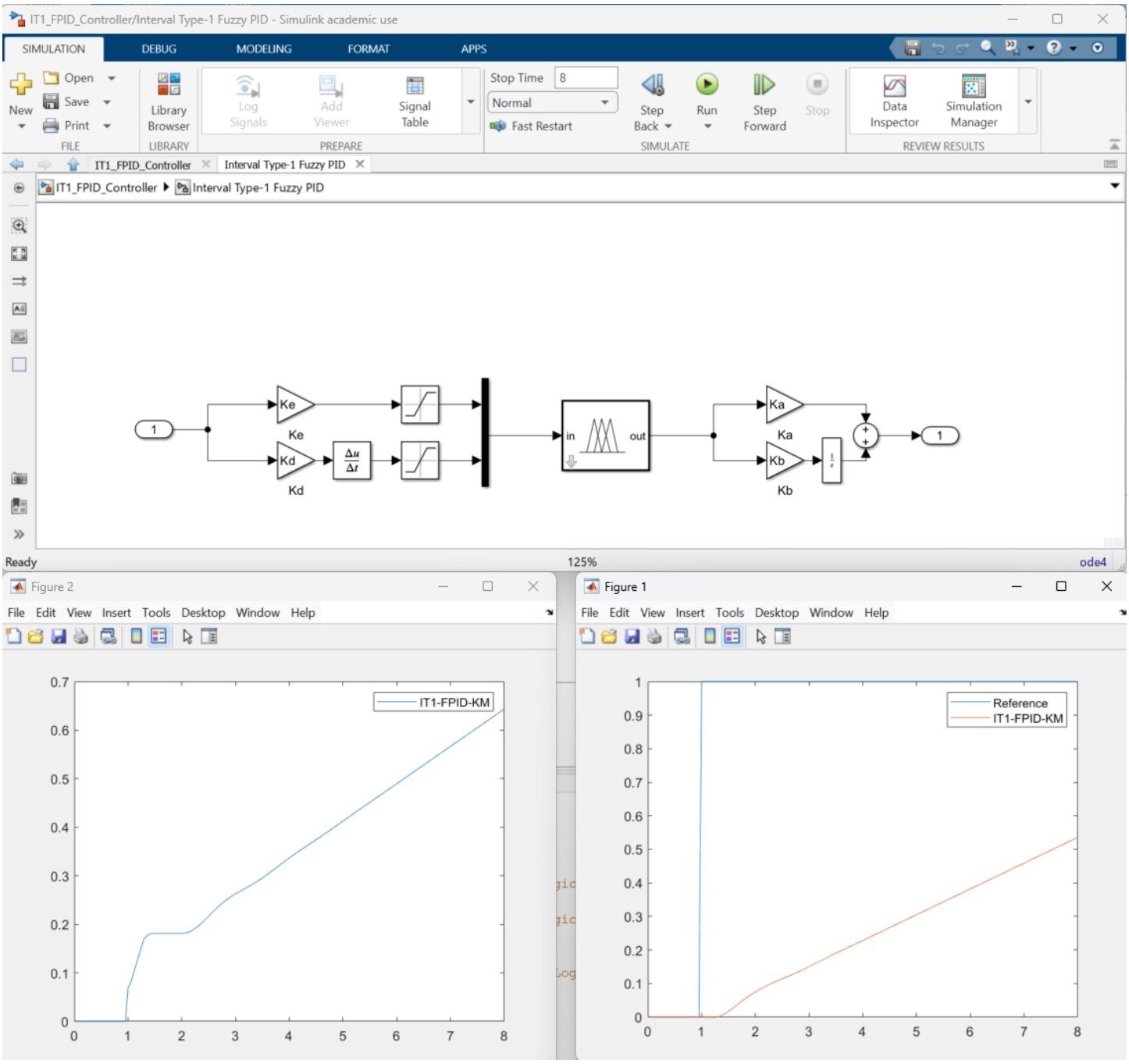

IT1_FPID_Controller/Interval Type-1 Fuzzy PID - Simulink academic use
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Print
FILE
Library Browser
LIBRARY
Log Signals
Add Viewer
Signal Table
PREPARE
Stop Time
8
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Simulation Manager
REVIEW RESULTS
IT1_FPID_Controller
Interval Type-1 Fuzzy PID
IT1_FPID_Controller ▸ Interval Type-1 Fuzzy PID
1
Ke
Ke
Kd
Kd
Δu/Δt
in
out
Ka
Ka
Kb
Kb
1
Ready
125%
ode4

Figure 2
File Edit View Insert Tools Desktop Window Help
IT1-FPID-KM
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 1 2 3 4 5 6 7 8

Figure 1
File Edit View Insert Tools Desktop Window Help
Reference
IT1-FPID-KM
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 1 2 3 4 5 6 7 8