NEURALNE MREZE

Izvestaj o drugom projektnom zadatku

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INTUITIVNI PRISTUP RESAVANJU

Varijanta V1, datoteke: model1.slx, resenje1.fis, resenje2.fis, resenje3.fis

Objekat upravljanja: G(s) = $\frac{-0.05\,s+0.0075}{(s+0.05)^2}\,e^{-3.6s}$

Referenca: $r\epsilon[-2, 2]$

Upravljanje: $u\epsilon[-1.2, 1.2]$

Time Delay = 3.6 sec

Greska: $e\epsilon[-4, 4]$

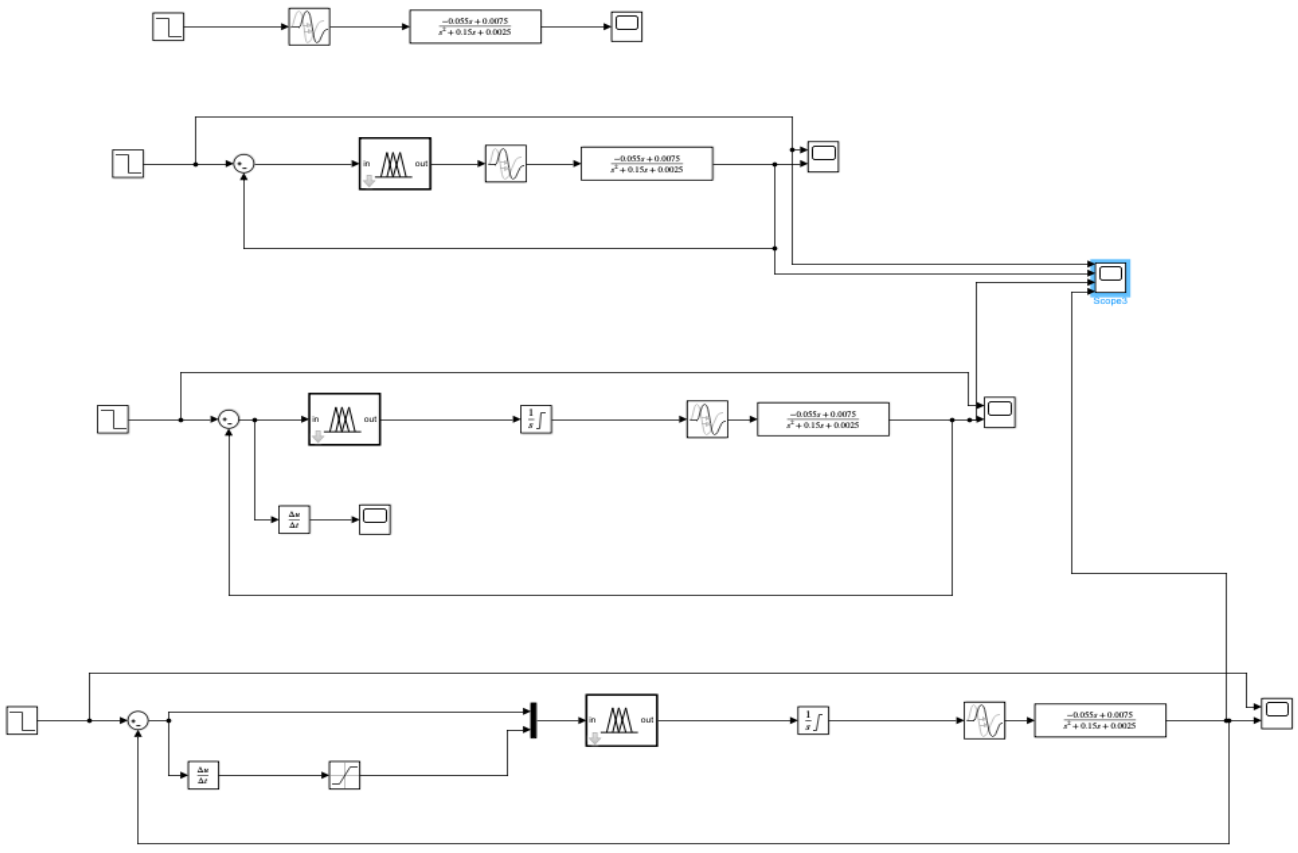
Parametri simulacije:

Stop time: 3600s

Type: Fixed-step

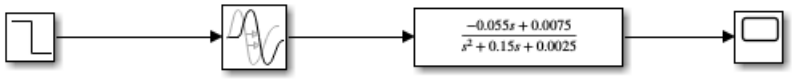
Step size: 1

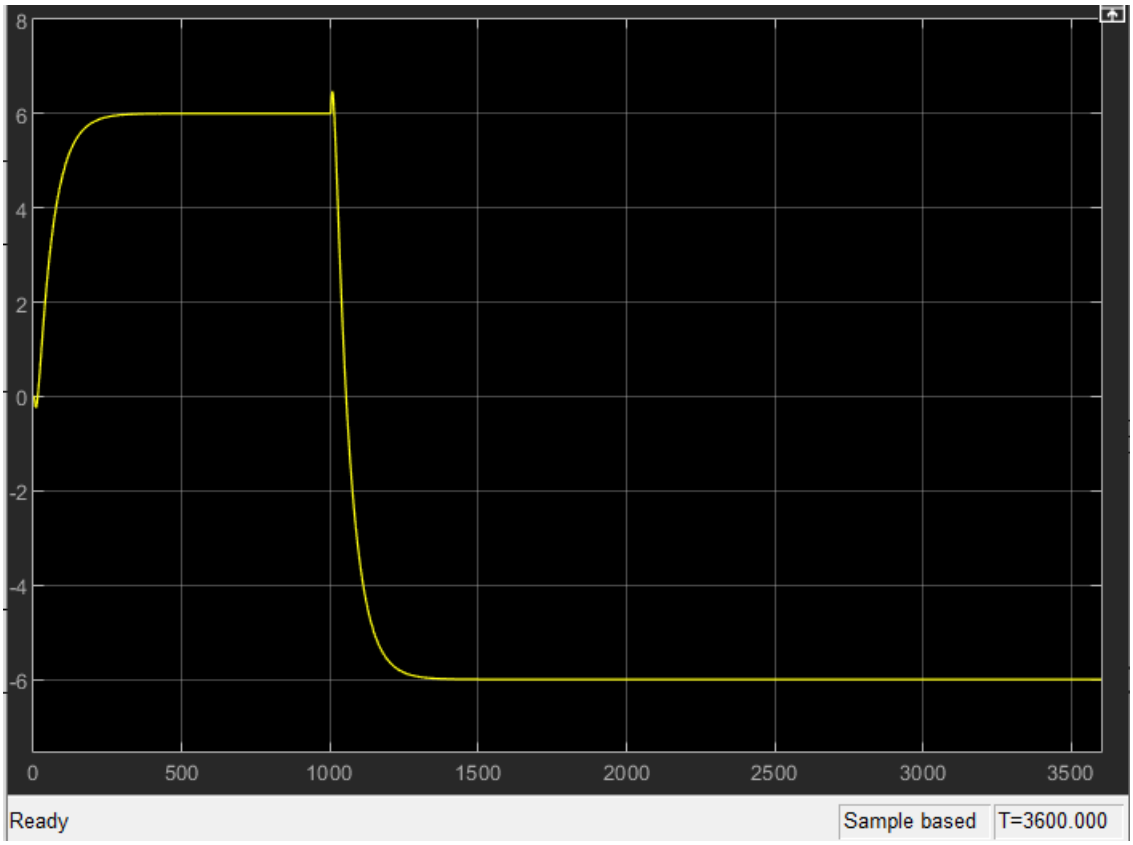
-Slika cele seme:



0.Obican sistem

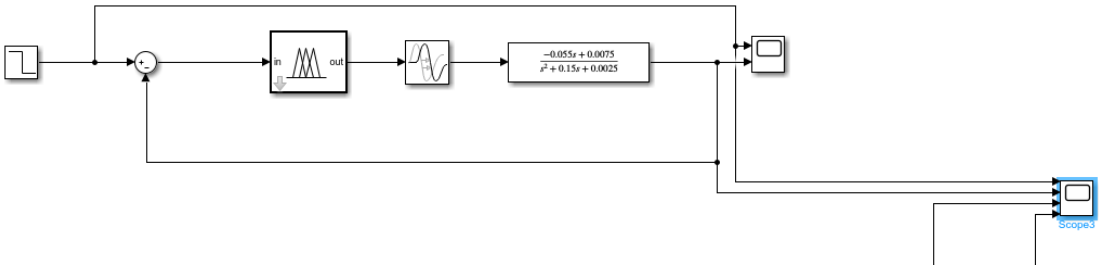
Ulaz: greska.



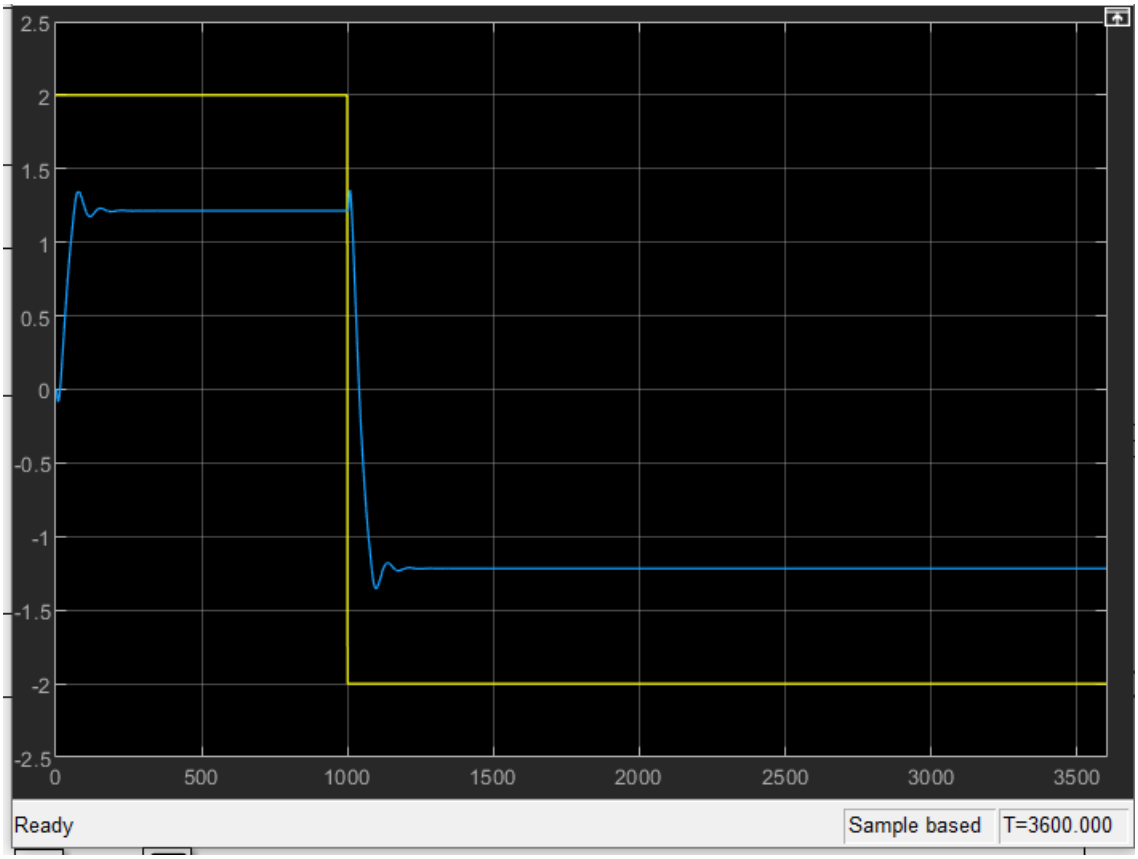


1.Fuzzy Kontroler

-Slika seme:



-Graf sistema:

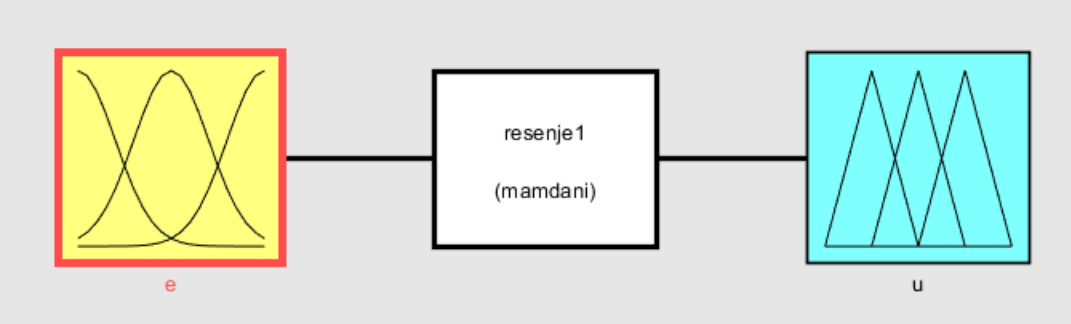


Izlaz nije uspeo da dostigne referencu.

U okolini greske koja je dosta mala kada smo dosli upravljanje nije uspelo da se podigne toliko kolikobi trebalo da dostigne referencu.

Ovo cemo resiti uvodjenjem "Integralnog dejstva"(kada greska padne na 0 sistem ce i dalje imati dovoljno upravljanje).

-Fuzzy za sistem(resenje1.fis):



- $e\epsilon[-4,4]$

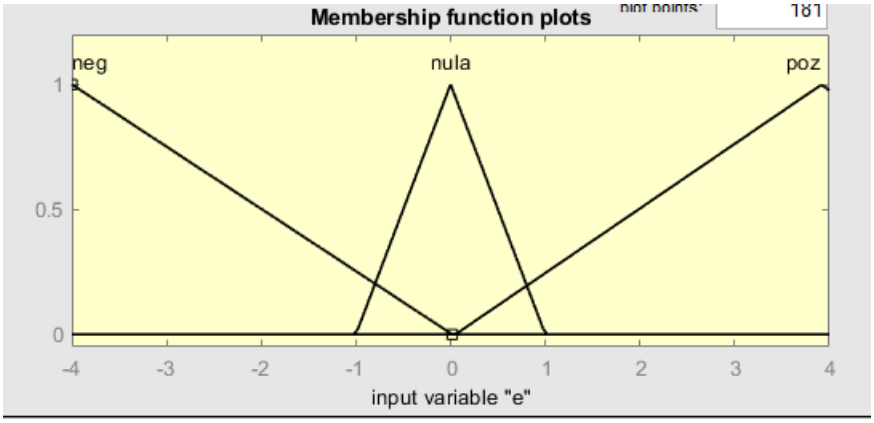
$u\epsilon[-1.2,1.2]$

-Ulaz e:

neg: [-7.33 -4 0.01691]

nula: [-1 0 1]

poz: [0.05074 3.92 7.25]

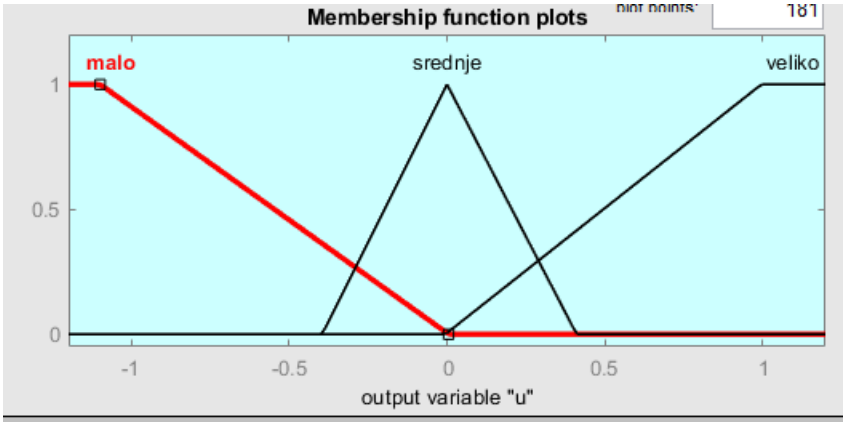


-Izlaz u:

malo: [-2.1 -1.3 -1.1 0.005074]

srednje: [-0.3958 0 0.411]

veliko: [-0.005074 0.997 1.2 2]

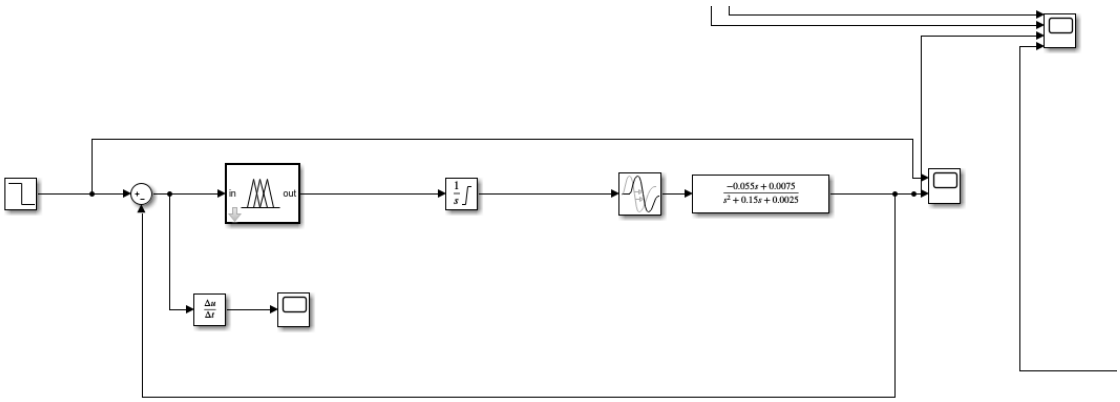


-RULES:

1. If (e is nula) then (u is srednje) (1)
2. If (e is neg) then (u is malo) (1)
3. If (e is poz) then (u is veliko) (1)

2.Integrator

-Slika seme:

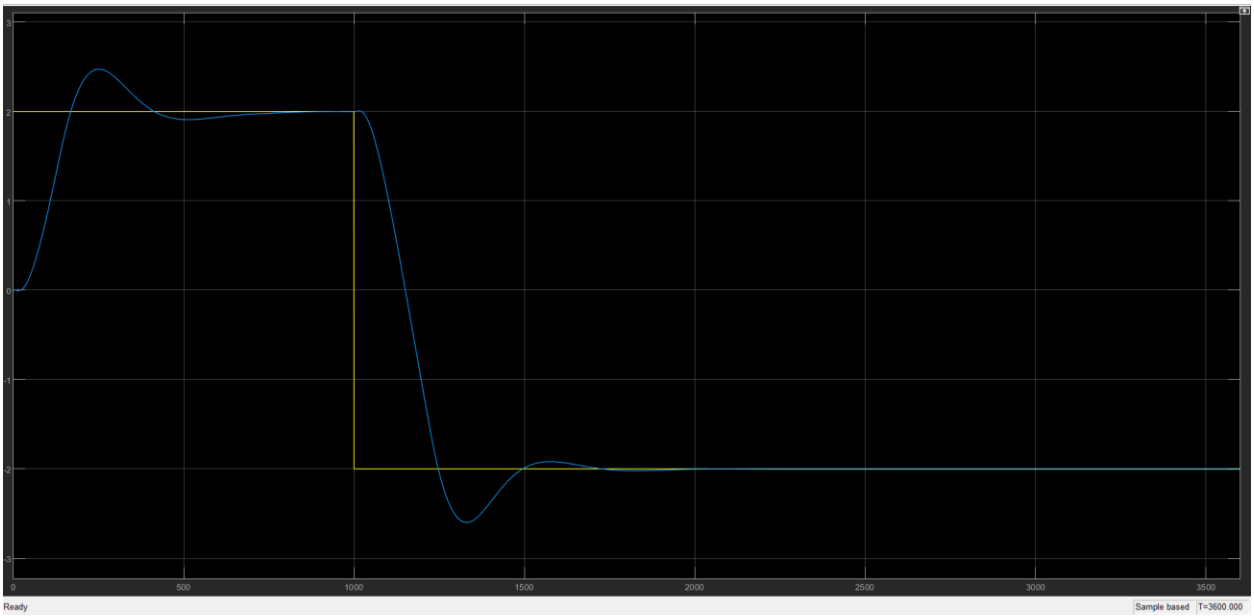


U sistem je dodata komponenta “Integrator Limited” sa parametrima:

Upper Saturation Limit: 1.2

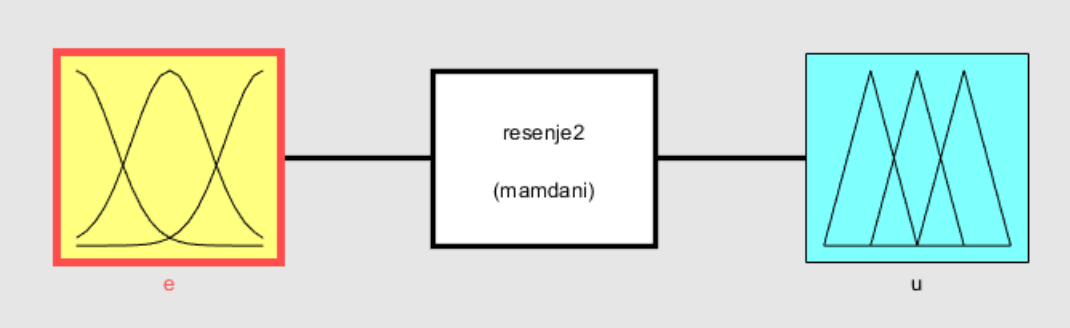
Lower Saturation Limit: -1.2

-Graf sistema:



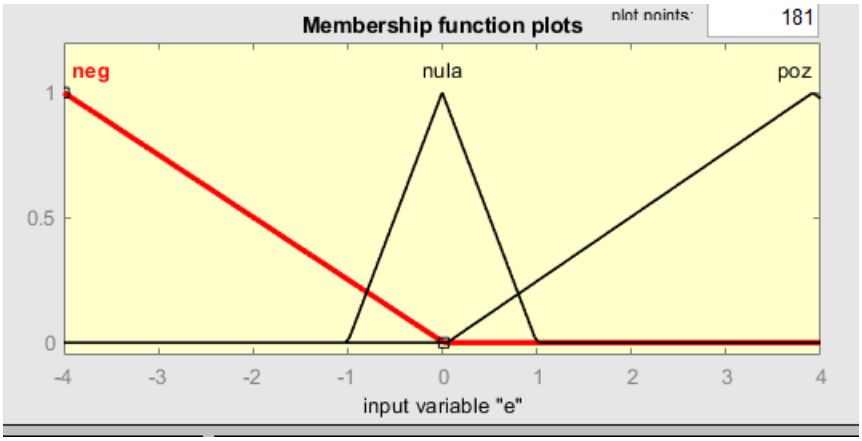
Izlaz je uspeo da dostigne referencu, ali javljaju se oscilacije na pocetku sto je mana sistema, odnosno postoji preskok i padovi oko reference.

-Fuzzy za sistem(resenje2.fis):

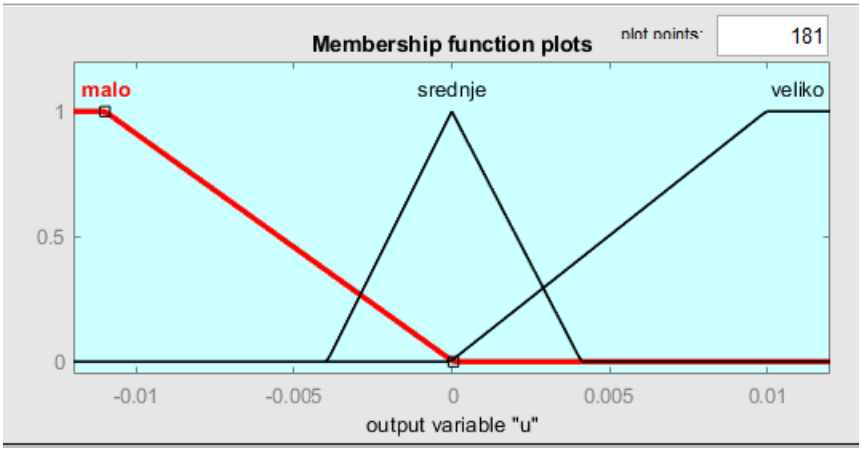


$\Delta U = U_{max} - U_{min} = 1.2 - (-1.2) = 2.4$
$\Delta t = 200$
Univerzum: 2.4/200 = 0.012
Univerzum $\epsilon[-0.012, 0.012]$
- $e\epsilon[-4, 4]$
$u\epsilon[-0.012, 0.012]$

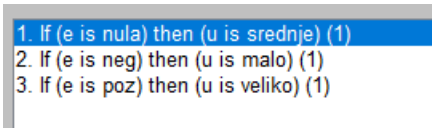
-Ulaz e:
neg: [-7.33 -4 0.01691]
nula: [-1 0 1]
poz: [0.05074 3.92 7.25]



-Izlaz u:
malo: [-0.021 -0.013 -0.011 5.074e-05]
srednje: [-0.003958 0 0.00411]
veliko: [-5.074e-05 0.00997 0.012 0.02]



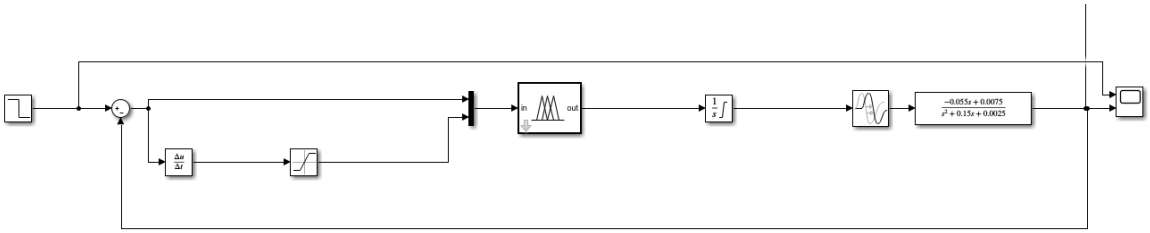
-RULES:



3.Diferencijalno dejstvo

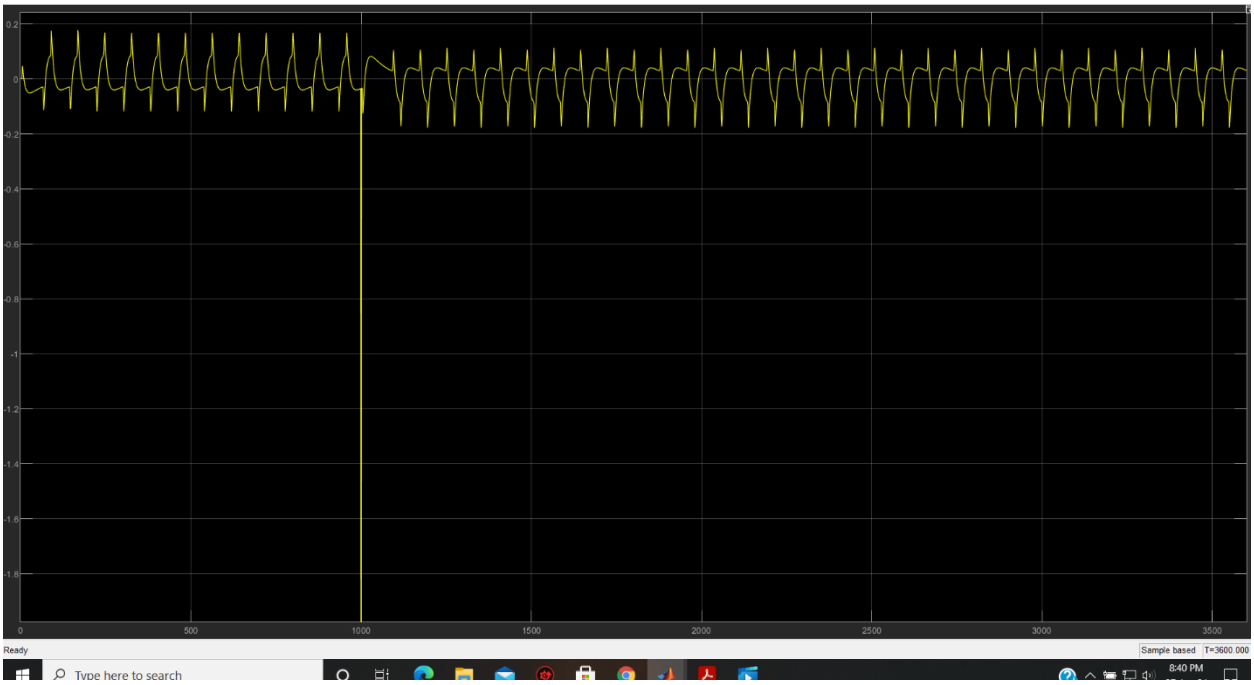
U pitanju je kontroler koji sadrzi i diferencijalno i integralno dejstvo.

-Slika seme:

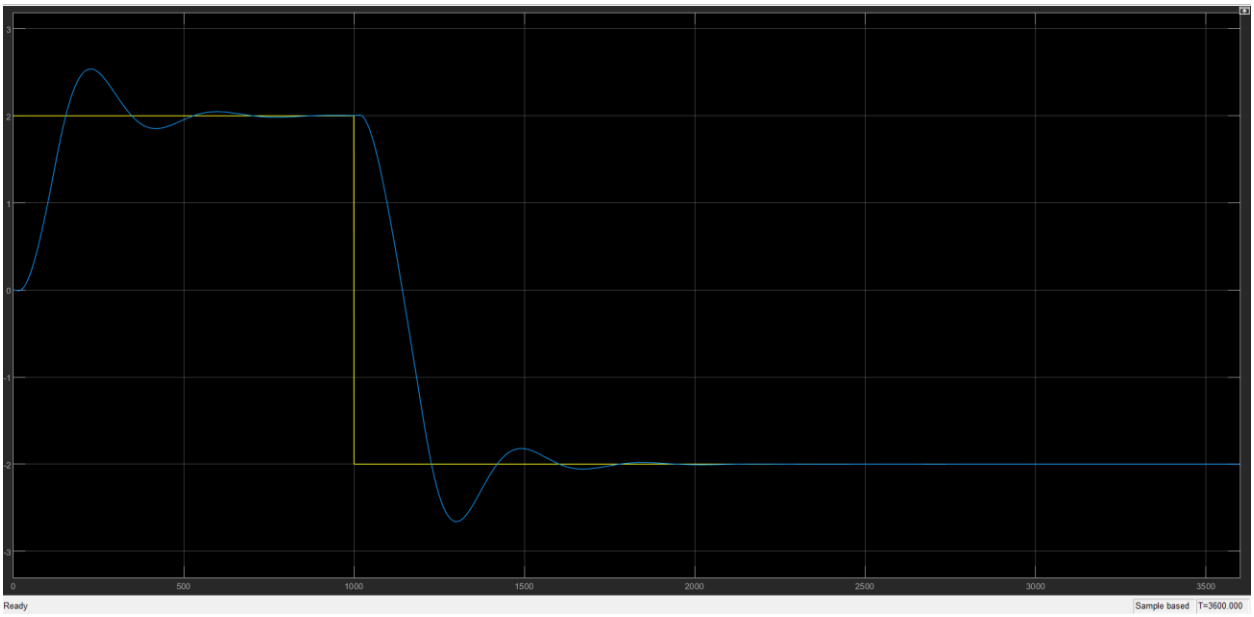


U sistem je dodata komponenta “Saturation” sa parametrima: UpperLimit = 0.18, Lower Limit = -0.18. Dati parametri su dobijeni iz opsega izvoda greske koja je vidljiva na Scope-u u prethodnoj tacki.

-Opseg izvoda greske:

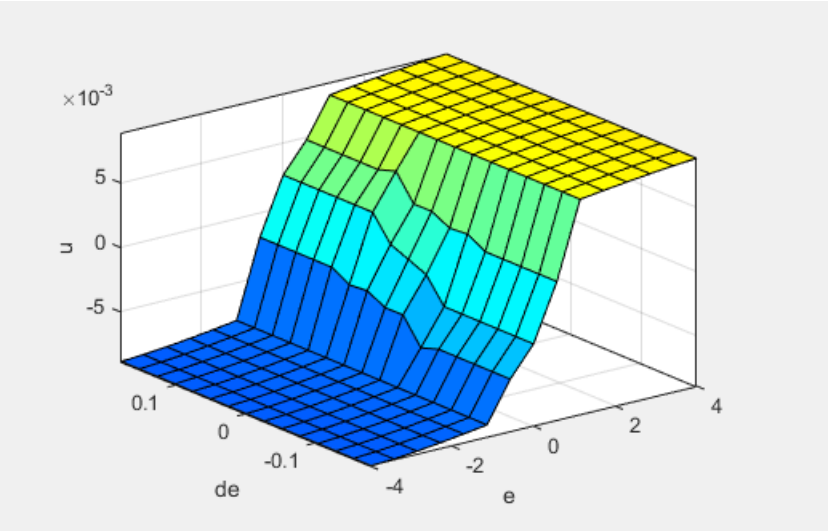


-Graf sistema:

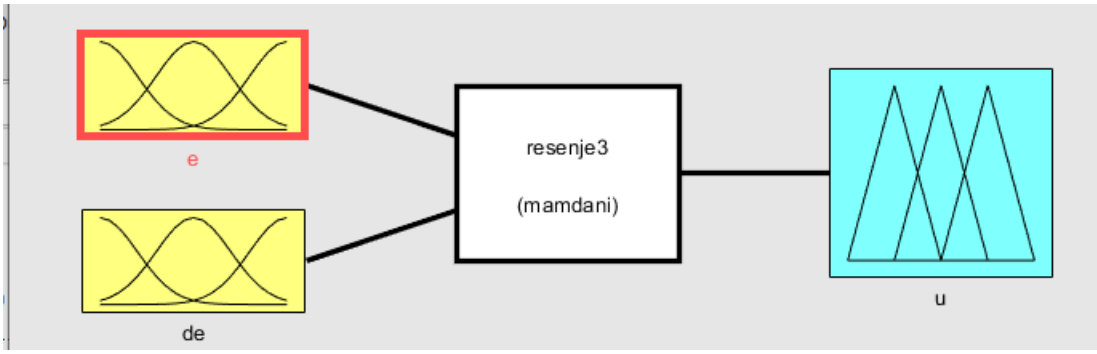


Oscilacije i preskok su dosta smanjeni u odnosu na prethodne pristupe,
dostiglo se stacionarno stanje. Odnosno, sistem je dostigao referencu mirnim putem, bez velikih oscilacija i bez velikog preskoka.

-Surface:

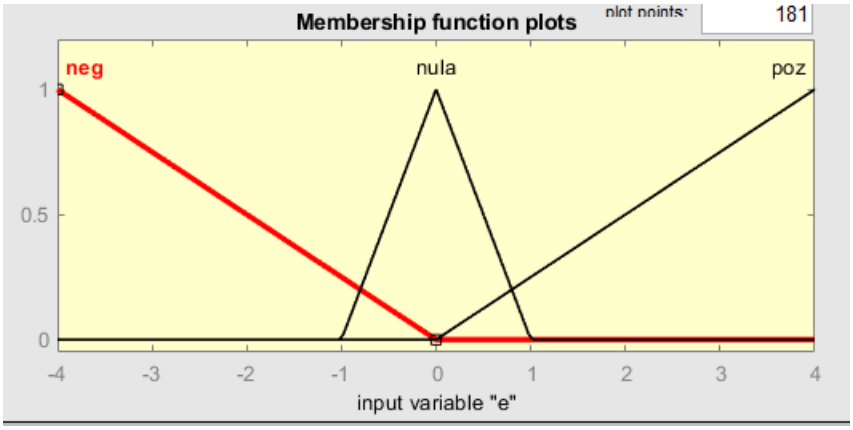


-Fuzzy za sistem(resenje3.fis):



$e\epsilon[-4, 4]$
$de\epsilon[-0.18, 0.18]$
$u\epsilon[-0.012, 0.012]$

-Ulaz e:
neg: [-7.33 -4 0]
nula: [-1 0 1]
poz: [0 4 7.25]

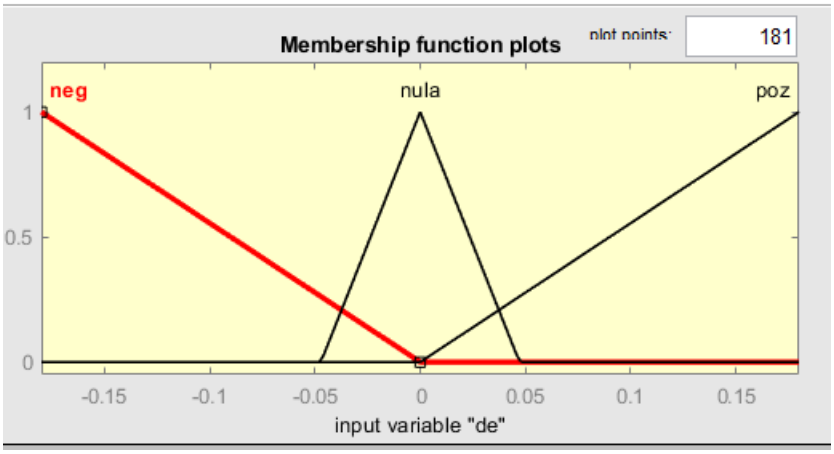


-Ulaz de:

neg: [-0.33 -0.18 0]

nula: [-0.0472 0 0.0472]

poz: [0 0.18 0.33]



-Izlaz u:

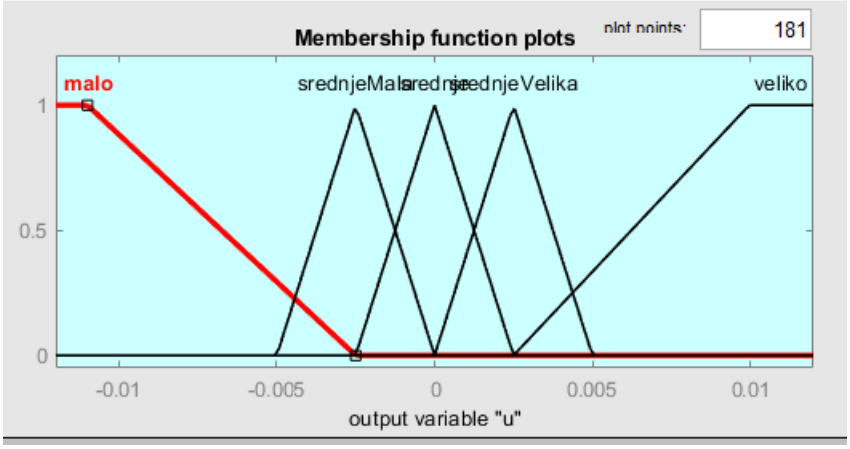
malo: [-0.021 -0.013 -0.011 -0.0025]

srednje: [-0.0025 0 0.0025]

veliko: [0.0025 0.00997 0.012 0.02]

srednjeMala: [-0.005 -0.0025 0]

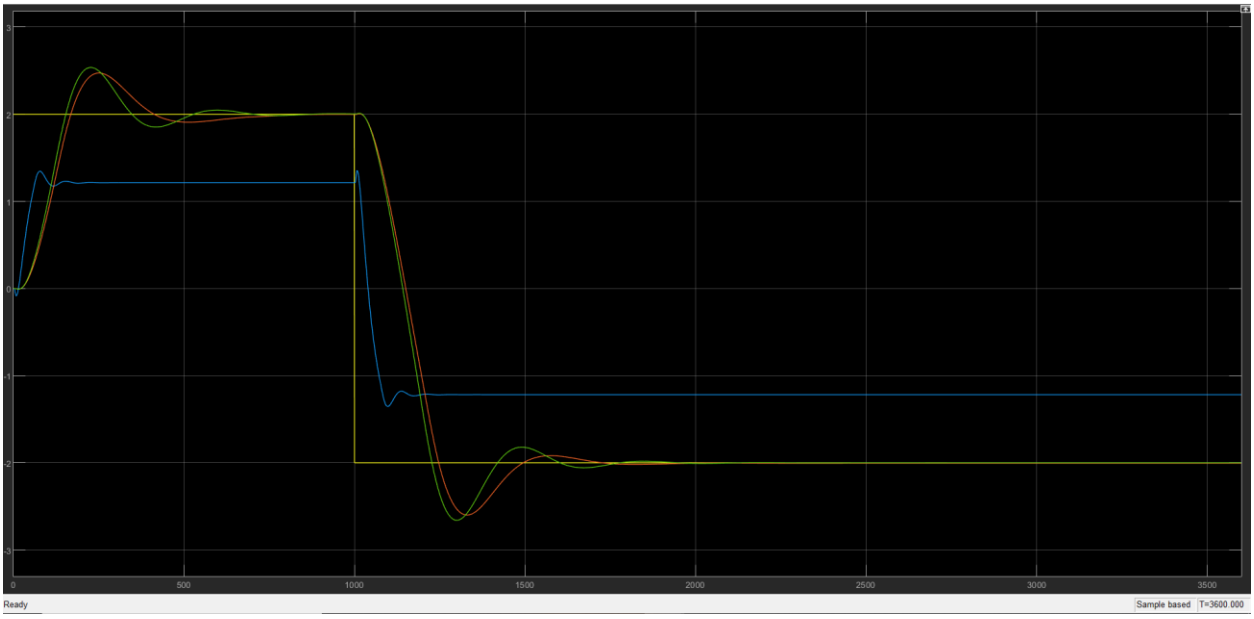
srednjeVelika: [0 0.0025 0.005]



-RULES:

1. If (e is neg) then (u is malo) (1)
2. If (e is poz) then (u is veliko) (1)
3. If (e is nula) and (de is nula) then (u is srednje) (1)
4. If (e is nula) and (de is neg) then (u is srednjeMala) (1)
5. If (e is nula) and (de is poz) then (u is srednjeVelika) (1)

Celokupan sistem



-PLAVO - (prvi) kontroler bez integratora, mala oscilacija na pocetku i sredini, uglavnom miran signal, ali ima gresku. Ne daje najbolje rezultate.

-CRVENO - kontroler sa integratorom

-ZELENO - kontroler sa diferencijalnim dejstvom i integratorom