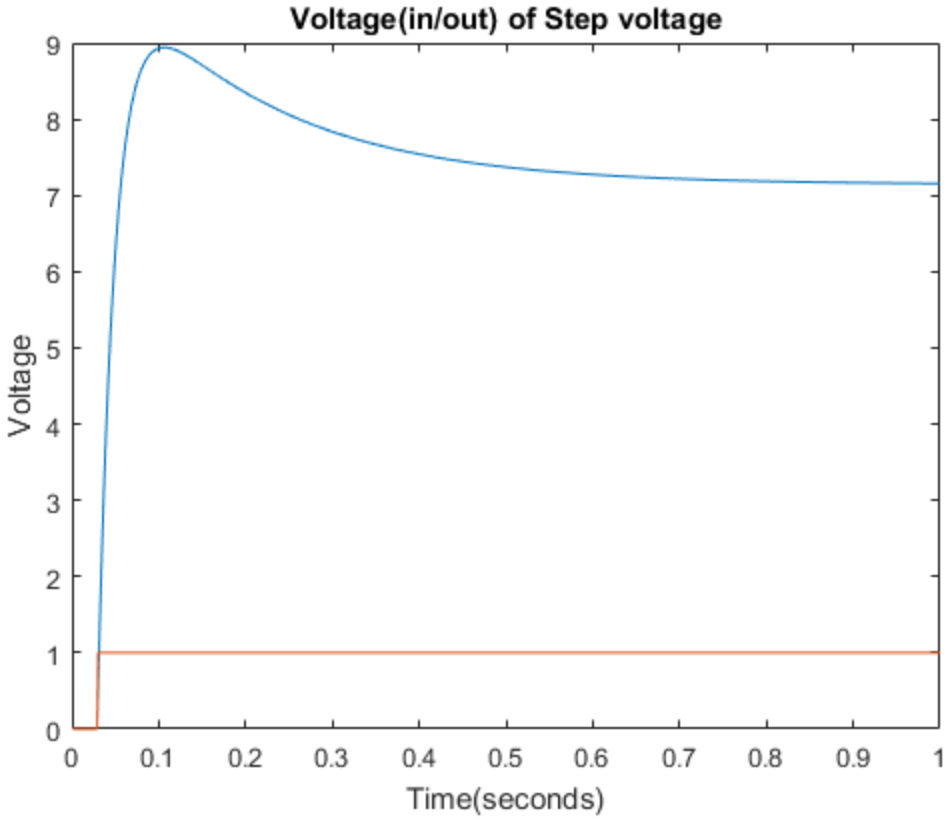
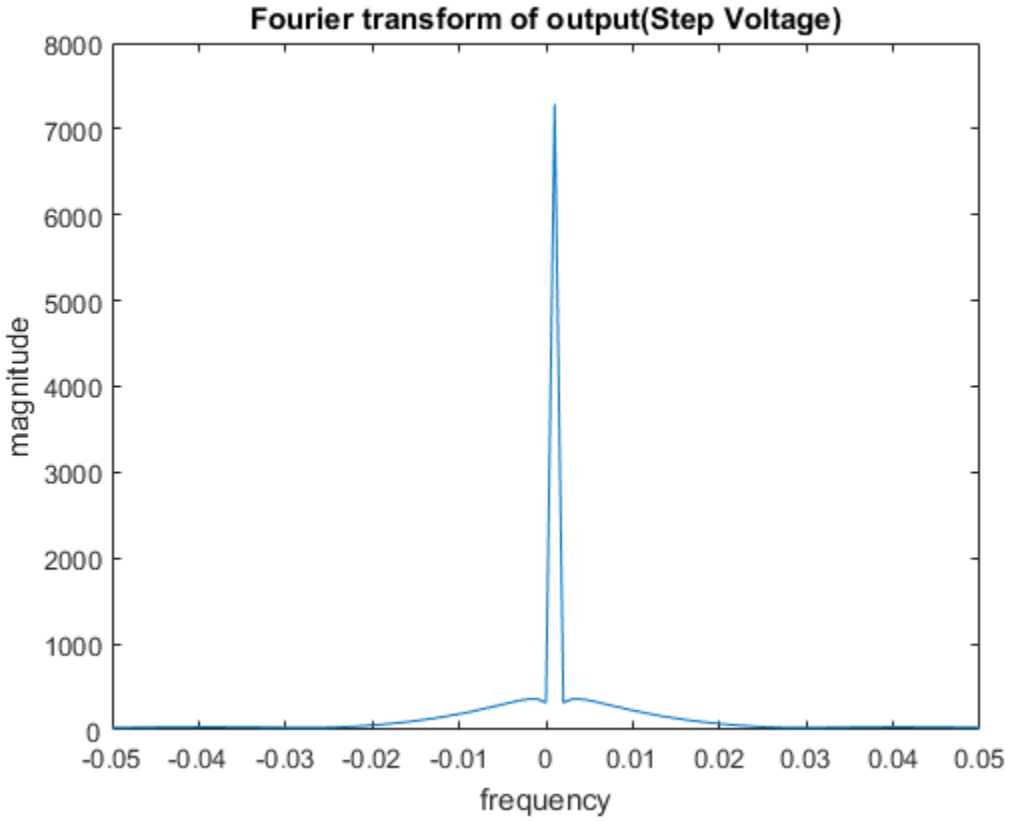
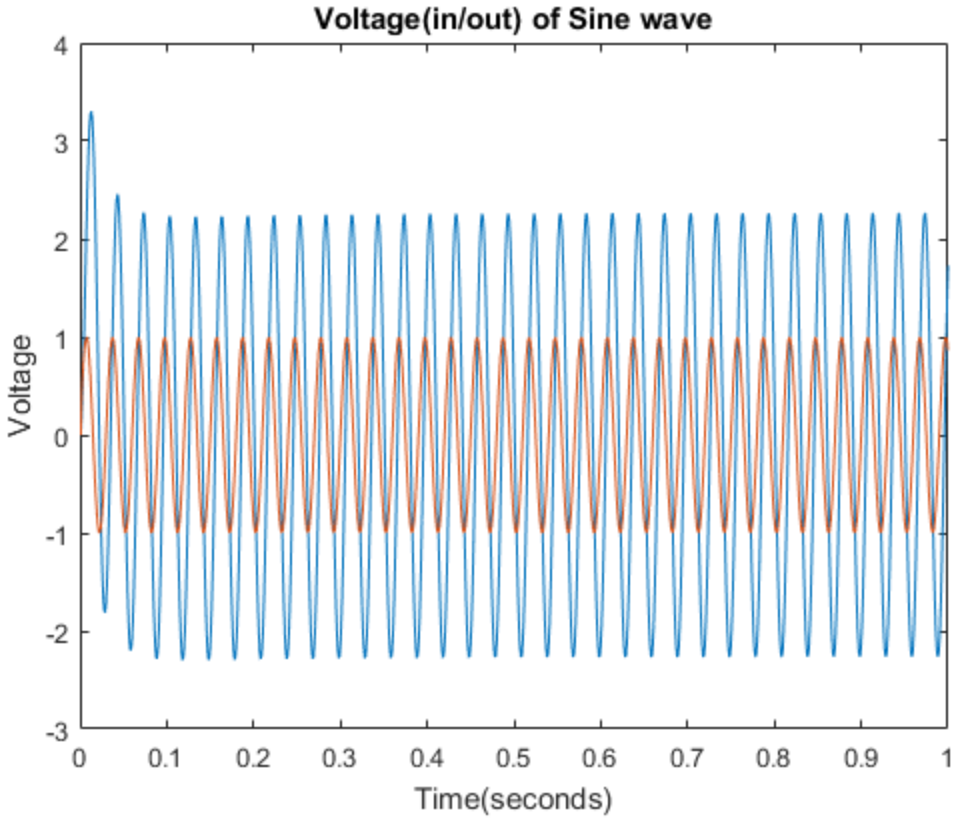
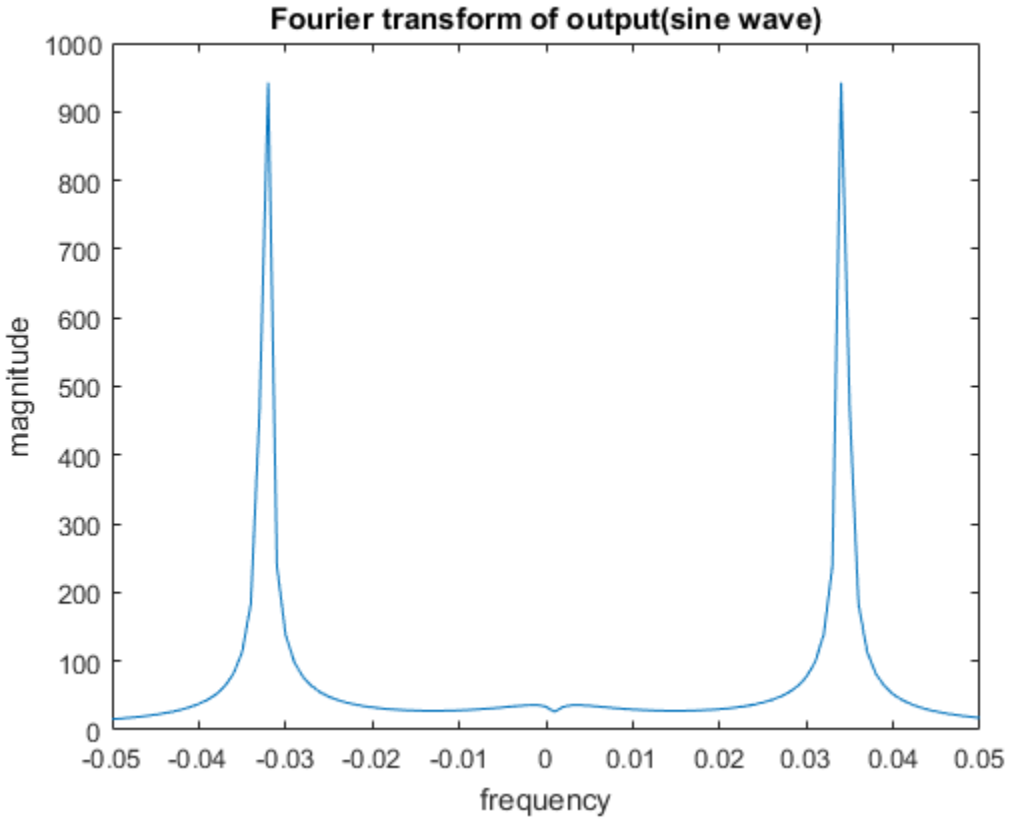
```
Warning: Imaginary parts of complex X and/or Y arguments ignored
2.(a) Represents a low pass circuit with amplifier. During DC
 conditions, the
capacitor will block current, however the resistors will let it
pass freely. The inductor will also let it pass freely.
However, once the current begins to alternate, the inductor
will begin to resist the current and the capacitor will begin
to conduct. This will cause parralel resistance and further
the resistance of the circuit
2.(b) I would expects a pass band during the low frequencies
 and a 2nd order drop off at its respective frequency

C =

         0         0         0         0         0         0         0
   -0.2500    0.2500         0         0         0         0         0
         0         0   -0.2000         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0


G =

    1.0000         0         0         0         0         0         0
   -1.0000    1.5000   -1.0000         0         0         0         0
         0    1.0000         0   -1.0000         0         0         0
         0         0   -1.0000    0.1000         0         0         0
         0         0         0         0 -100.0000    1.0000         0
         0         0         0    0.1000   -1.0000         0         0
         0         0         0         0         0  -10.0000   10.0010

changing the time step to be larger, makes a more inaccurate model

C =

  Columns 1 through 7

         0         0         0         0         0         0         0
   -0.2500    0.2500         0         0         0         0         0
         0         0   -0.2000         0         0         0         0
         0         0         0    0.0000         0         0         0
         0         0         0         0         0         0         0
         0         0         0    0.0000         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Column 8

         0
         0
```

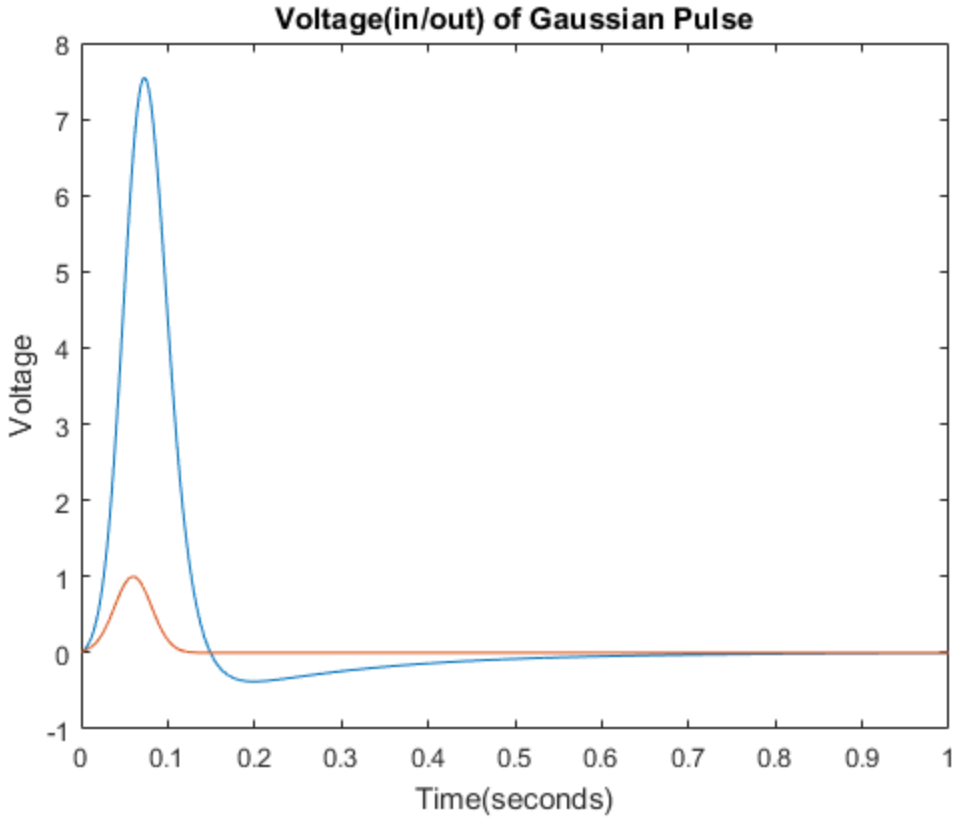
```
         0
         0
         0
         0
         0
         0


G =

  Columns 1 through 7

    1.0000         0         0         0         0         0         0
   -1.0000    1.5000   -1.0000         0         0         0         0
         0    1.0000         0   -1.0000         0         0         0
         0         0   -1.0000    0.1000         0         0   -1.0000
         0         0         0         0 -100.0000    1.0000         0
         0         0         0    0.1000   -1.0000         0   -1.0000
         0         0         0         0         0         0    1.0000
         0         0         0         0         0  -10.0000         0

  Column 8

         0
         0
         0
         0
         0
         0
         0
   10.0010

3.(c.6)Raising the Cn of the circuit tends to elongate the bandwidth
3.(c.7) changing the timesteps with the In and Cn added,
causes the peak positions to change, and the noise to become more or
 less
 significant. Raising the time steps reduces noise, and lowering it
 increases it.
This is suspected to occur because it is changing how long a noise
 signal
Will affect the circuit, including some of its transience
4.(a) model the equation V4 - aI3 - BI3^2 -CI3^3 as a polynomial and
 solve for it
This would require a solve for the polynomial per iteration as V4
 changes
as well as an update to the F matrix per iteration to include the
 changing I3
```

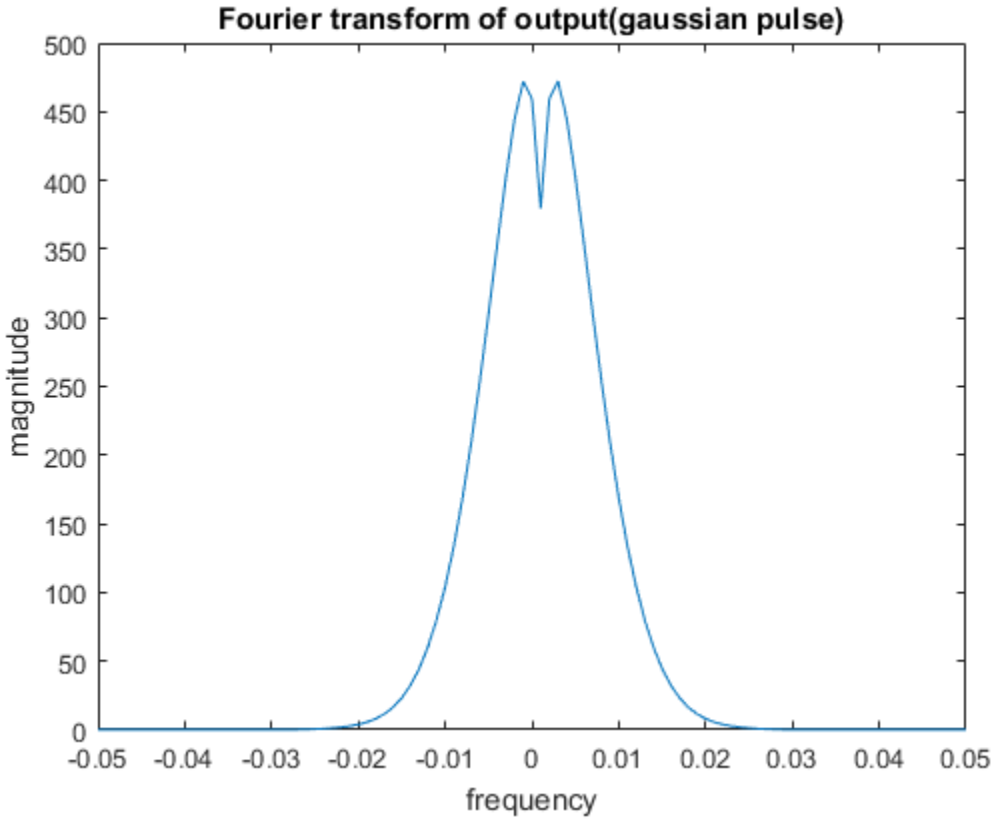

Voltage(in/out) of Step voltage
Voltage
Time(seconds)
0
1
2
3
4
5
6
7
8
9
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

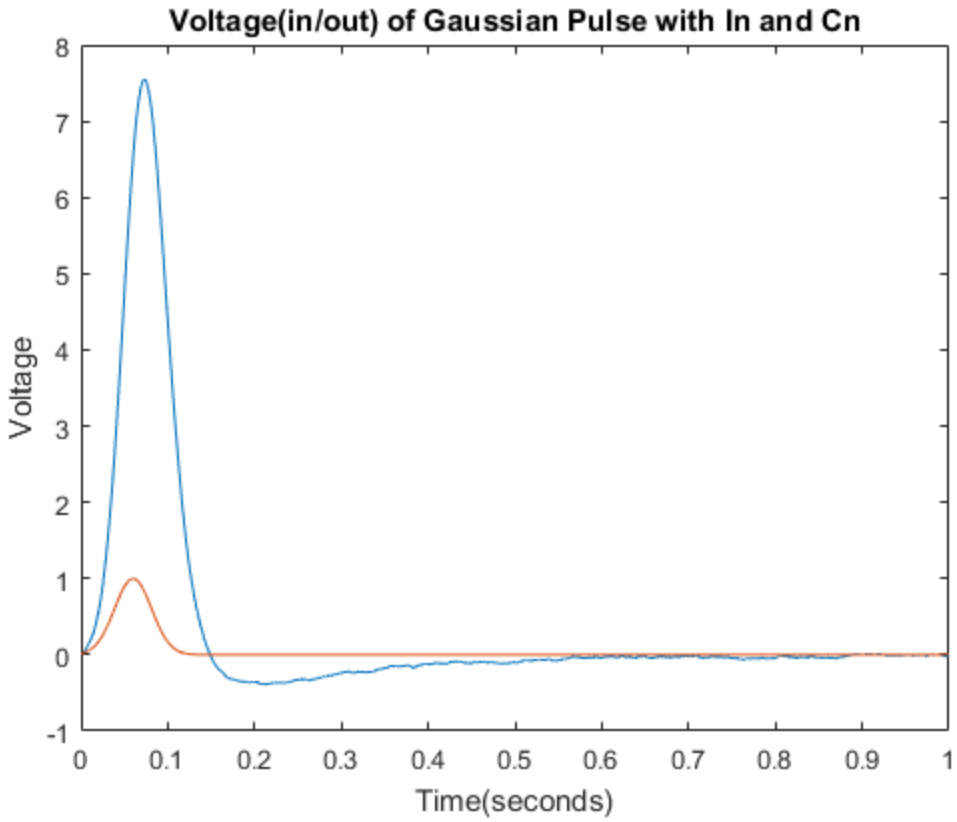

Fourier transform of output(Step Voltage)
magnitude
frequency
0
1000
2000
3000
4000
5000
6000
7000
8000
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

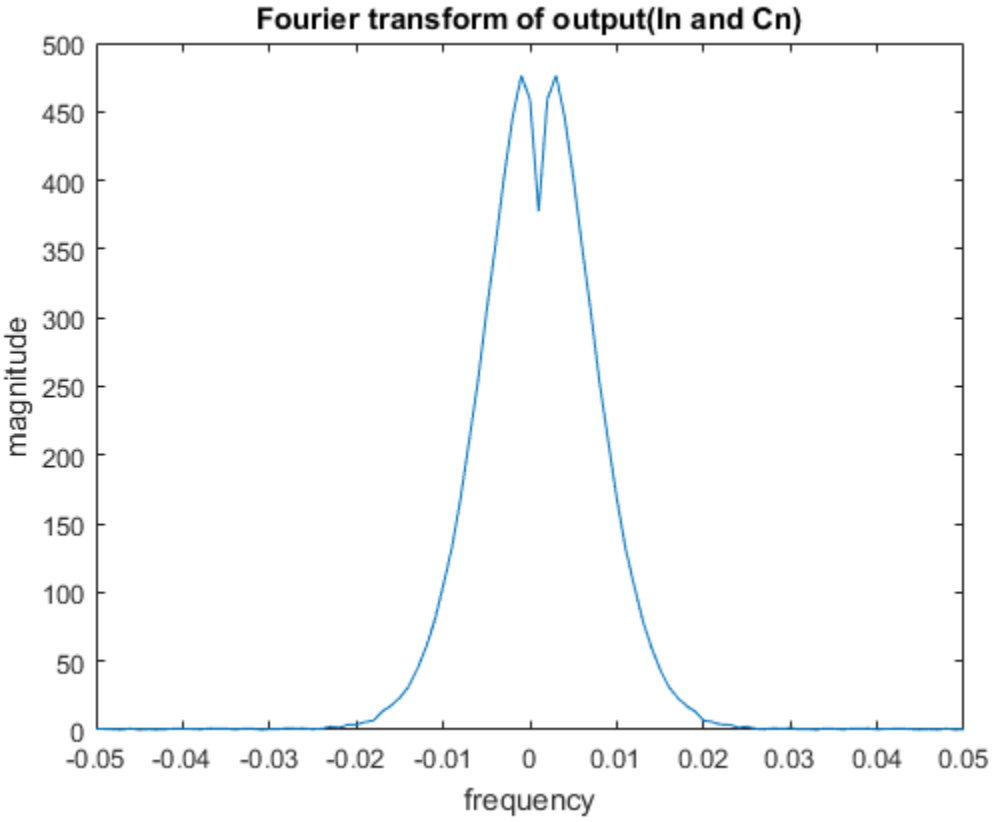

Voltage(in/out) of Sine wave
Voltage
Time(seconds)
4
3
2
1
0
-1
-2
-3
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

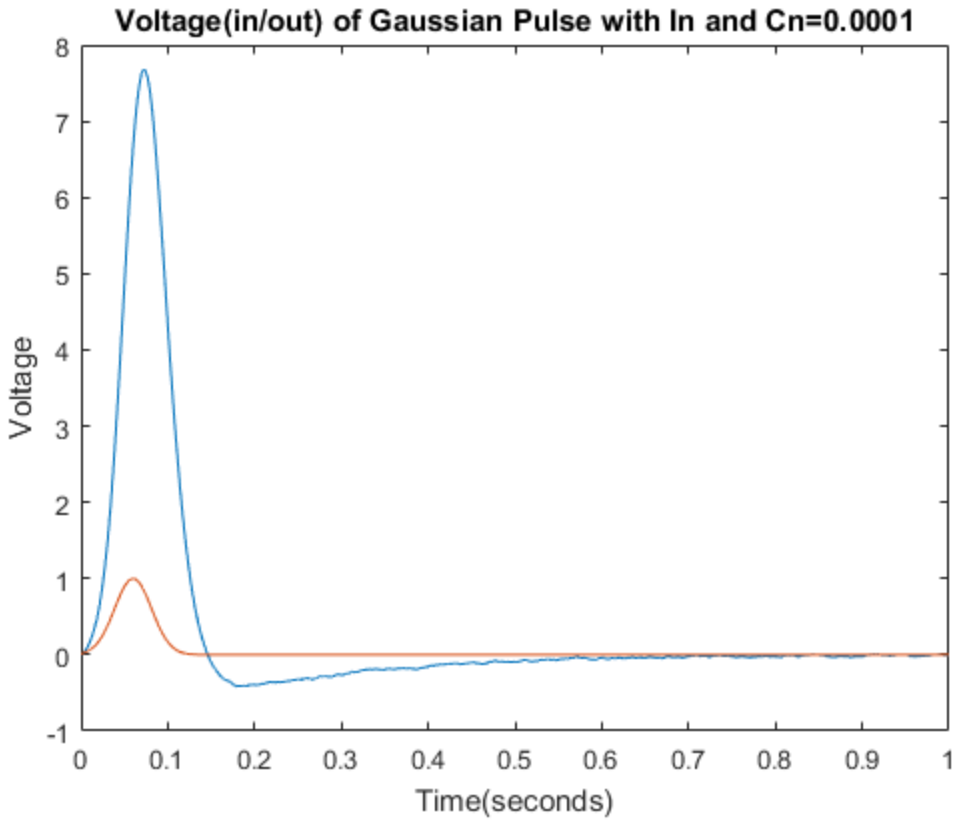

Fourier transform of output(sine wave)
magnitude
frequency
1000
900
800
700
600
500
400
300
200
100
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

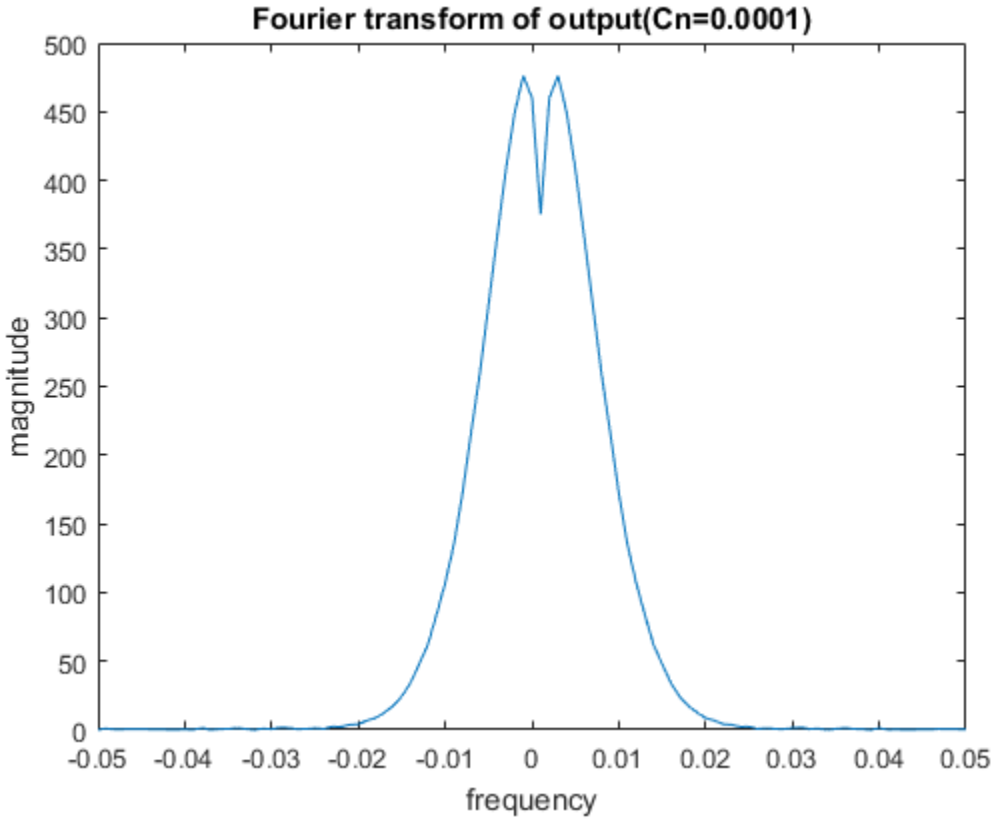

Voltage(in/out) of Gaussian Pulse
Voltage
Time(seconds)
8
7
6
5
4
3
2
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

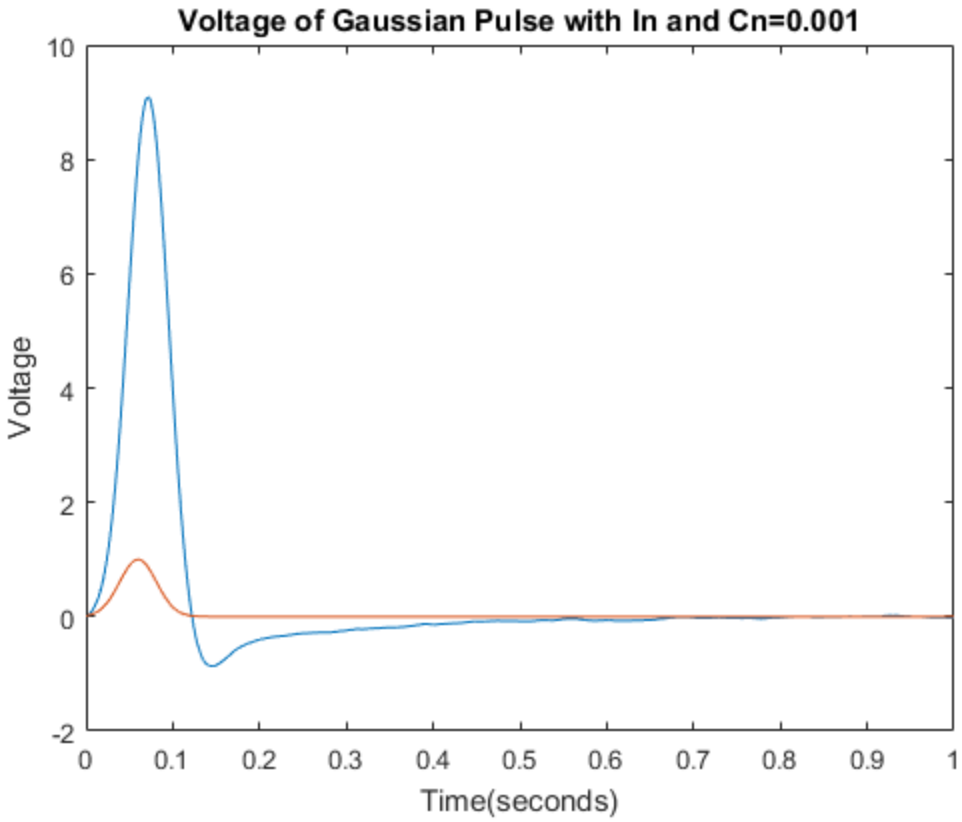

Fourier transform of output(gaussian pulse)
magnitude
frequency
500
450
400
350
300
250
200
150
100
50
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

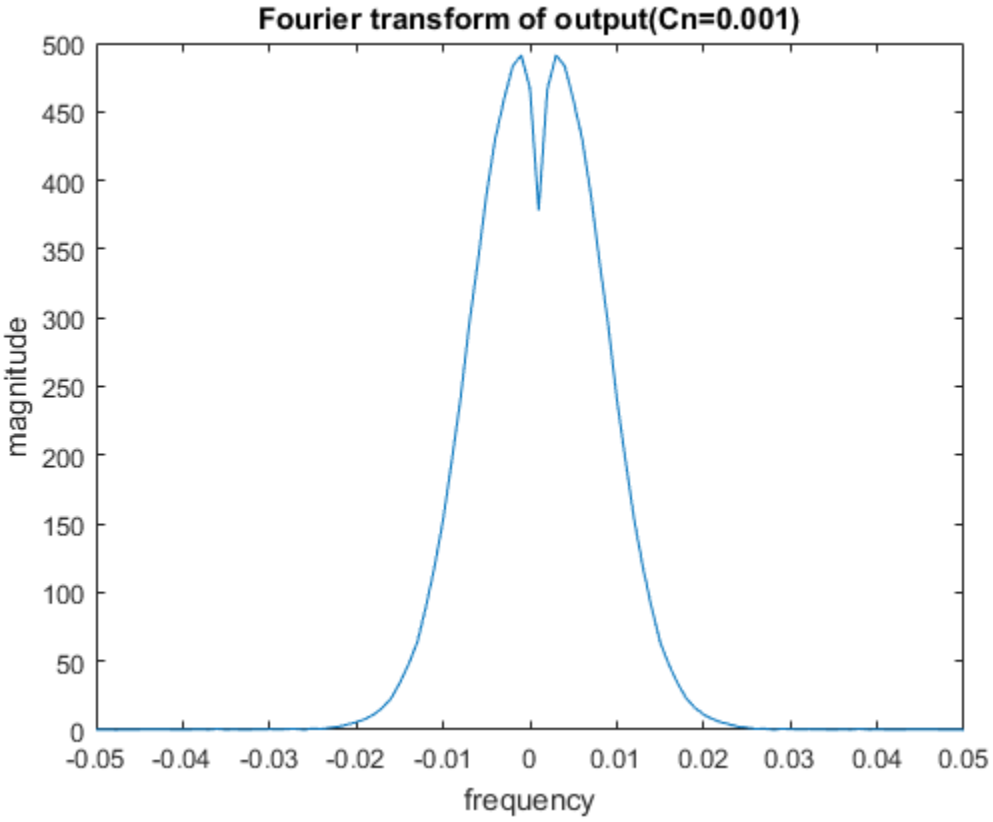

Voltage(in/out) of Gaussian Pulse with In and Cn
Voltage
Time(seconds)
8
7
6
5
4
3
2
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

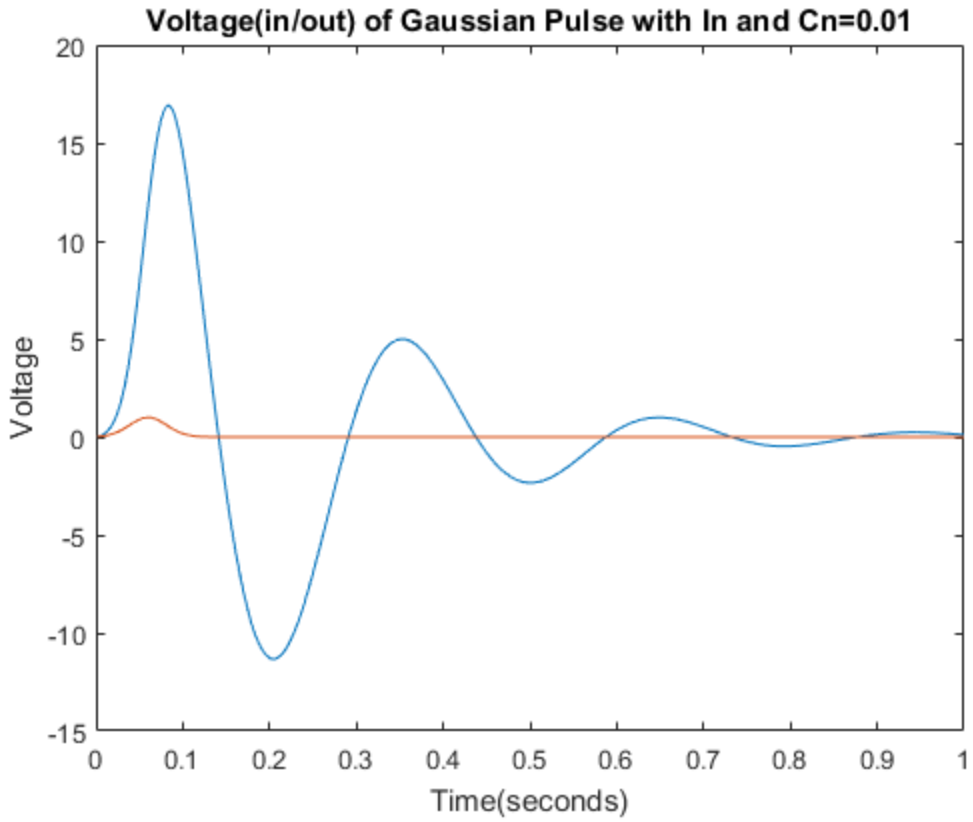

Fourier transform of output(In and Cn)
magnitude
frequency
500
450
400
350
300
250
200
150
100
50
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

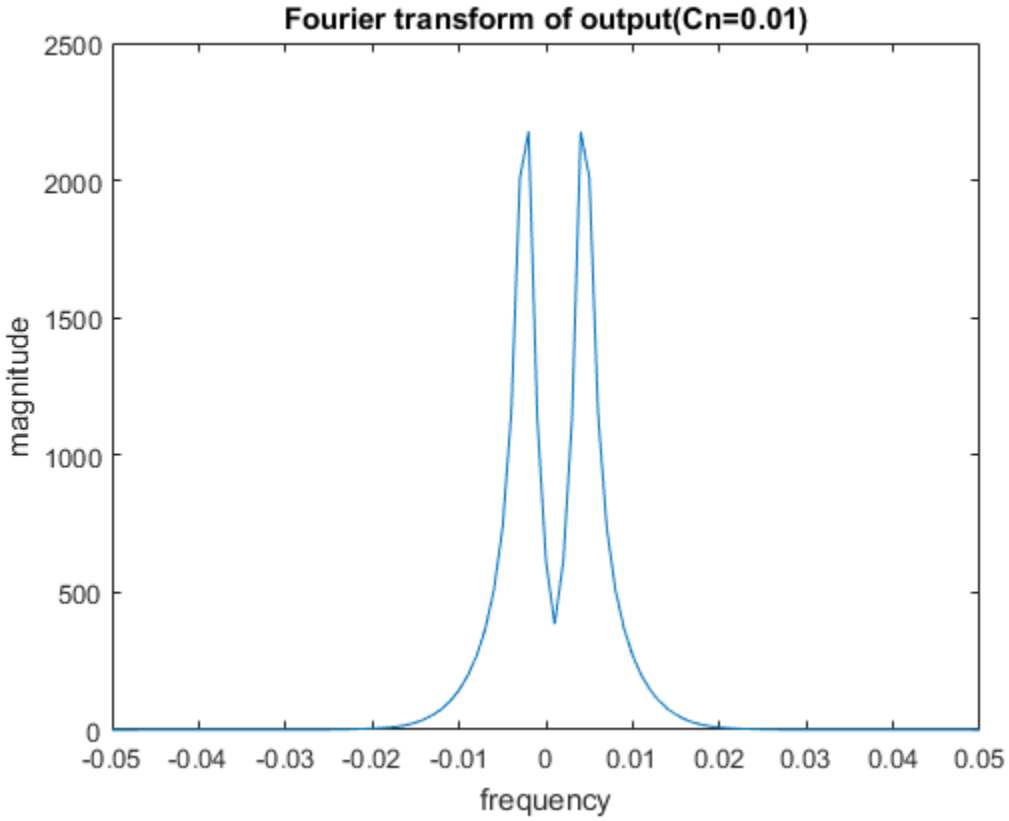

Voltage(in/out) of Gaussian Pulse with In and Cn=0.0001
Voltage
Time(seconds)
8
7
6
5
4
3
2
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

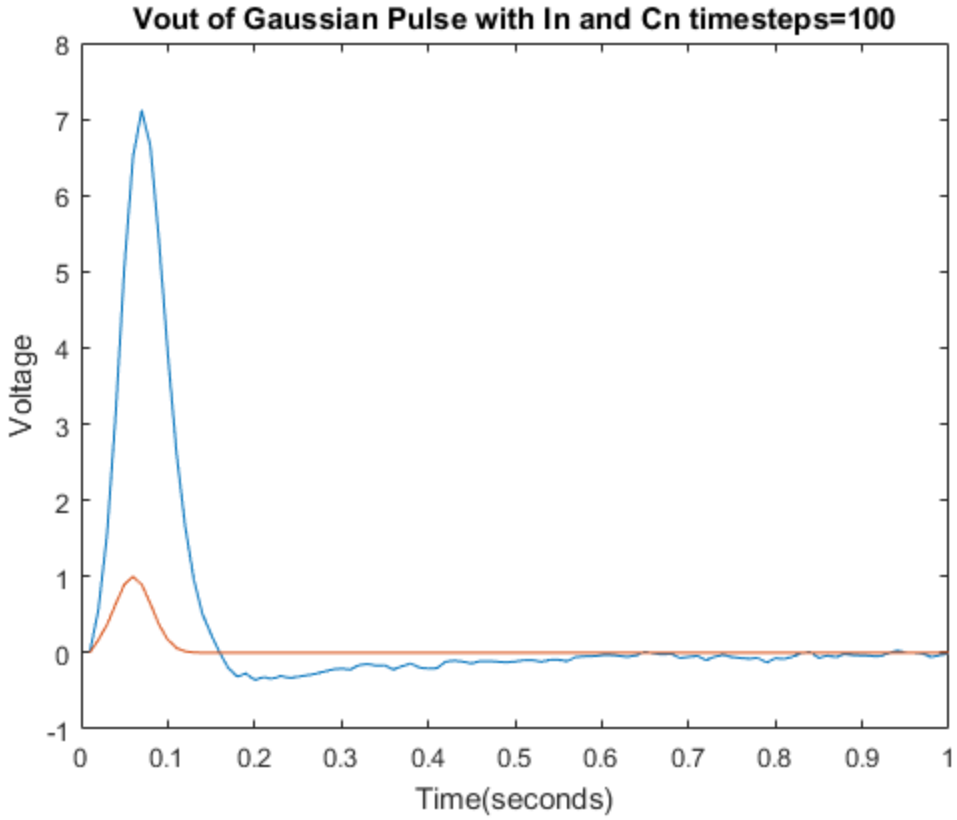

Fourier transform of output(Cn=0.0001)
magnitude
frequency
500
450
400
350
300
250
200
150
100
50
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

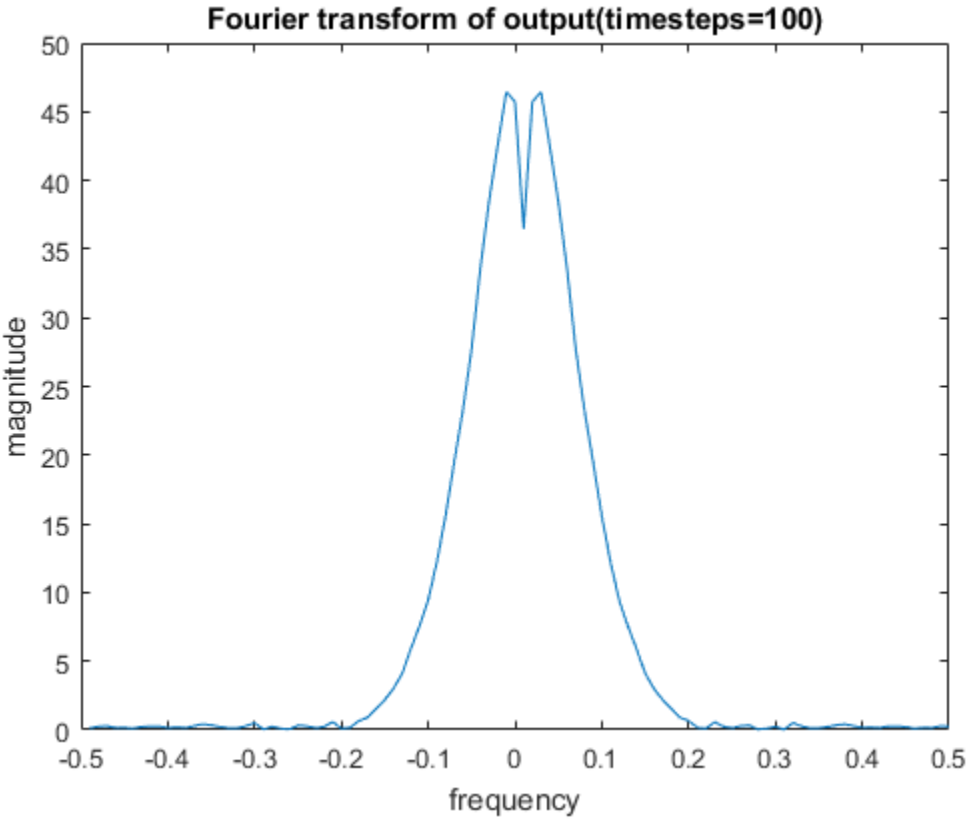

Voltage of Gaussian Pulse with In and Cn=0.001
Voltage
Time(seconds)
10
8
6
4
2
0
-2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

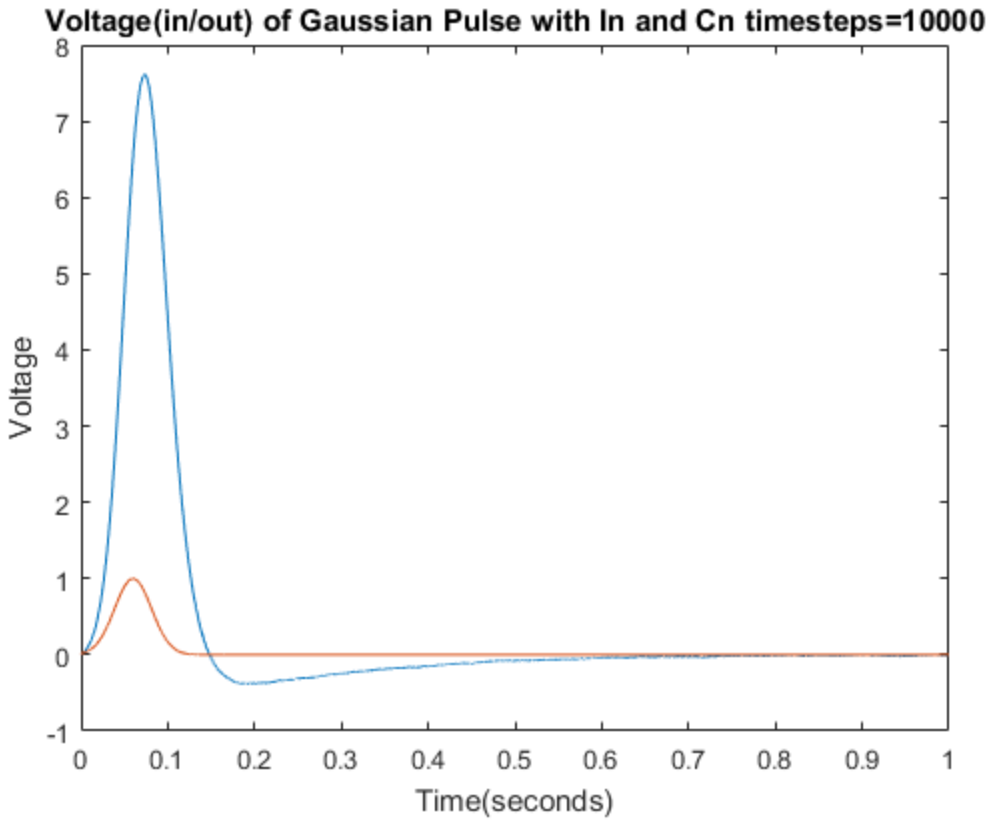

Fourier transform of output(Cn=0.001)
magnitude
frequency
500
450
400
350
300
250
200
150
100
50
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05

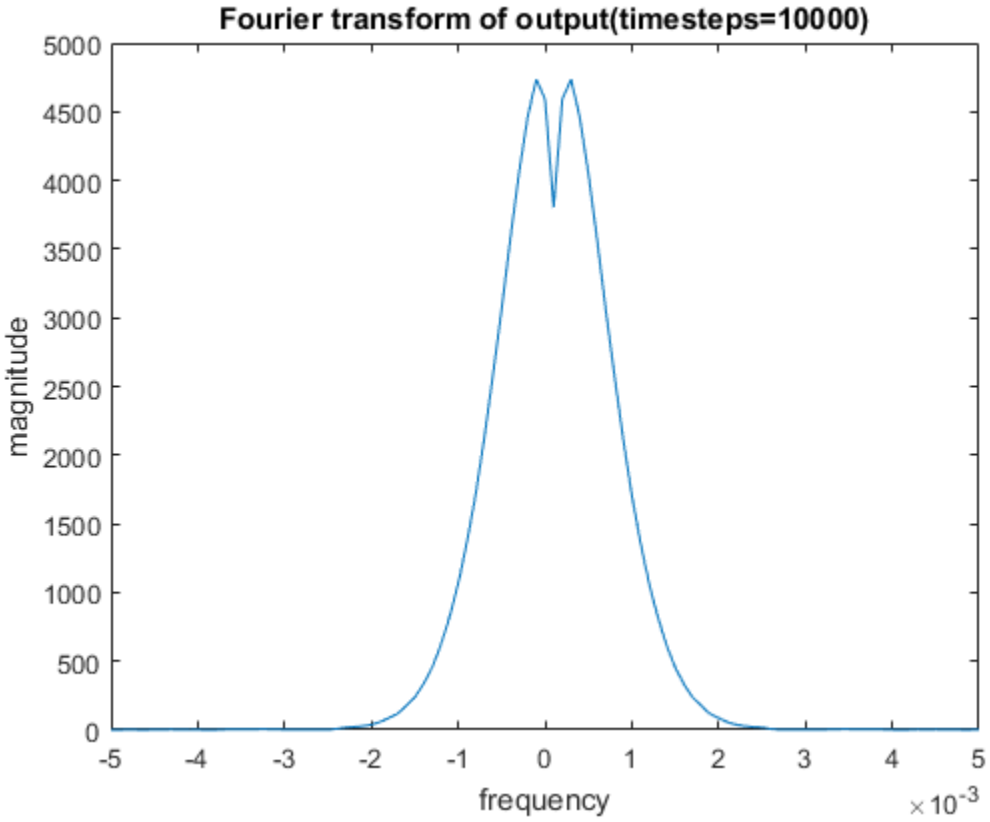

Voltage(in/out) of Gaussian Pulse with In and Cn=0.01
Voltage
Time(seconds)
20
15
10
5
0
-5
-10
-15
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Fourier transform of output(Cn=0.01)
magnitude
frequency
2500
2000
1500
1000
500
0
-0.05
-0.04
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
0.04
0.05


Vout of Gaussian Pulse with In and Cn timesteps=100
Voltage
Time(seconds)
8
7
6
5
4
3
2
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Fourier transform of output(timesteps=100)
magnitude
frequency
50
45
40
35
30
25
20
15
10
5
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5


Voltage(in/out) of Gaussian Pulse with In and Cn timesteps=10000
Voltage
Time(seconds)
8
7
6
5
4
3
2
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Fourier transform of output(timesteps=10000)
magnitude
frequency
×10-3
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-5
-4
-3
-2
-1
0
1
2
3
4
5

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