Scilab Manual for Signals and Systems by Prof Manisha Joshi Electronics Engineering VESIT[1]

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Experiment: 1

To express sum of two complex exponentials as a single sinusoid

Scilab code Solution 1.1 To express sum of two complex exponentials as a single sinusoid

```
1 //To express sum of two complex exponentials as a
     single sinusoid
2 //scilab 5.4.1 ;64 bit(windows 8)
3 clear;
4 clc;
5 close;
6 t =0:1/100:2*%pi;
7 x1 = exp(sqrt(-1)*2*t);
8 x2 = exp(sqrt(-1)*3*t);
9 x = x1+x2;
10 for i = 1:length(x)
11   X(i) = sqrt((real(x(i)).^2)+(imag(x(i)).^2));
12 end
13 plot(t,X);
```

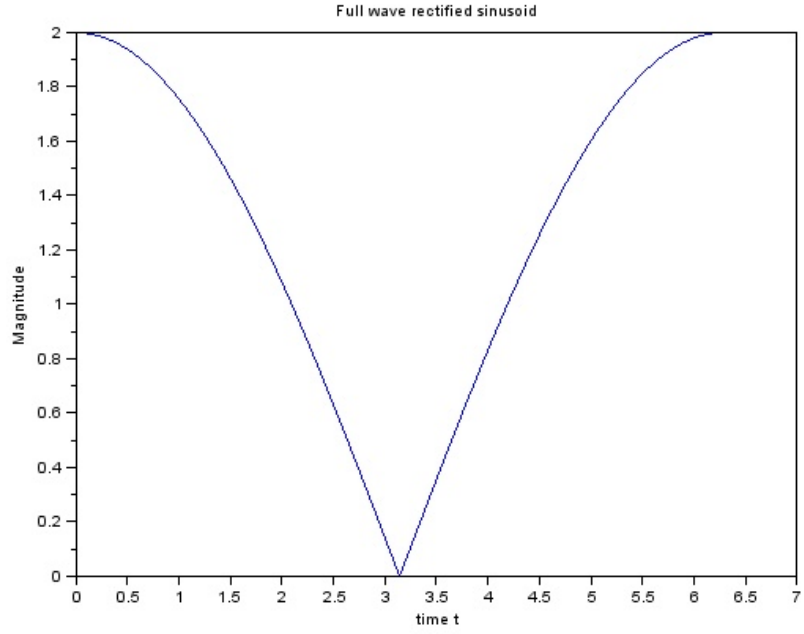

Figure 1.1: To express sum of two complex exponentials as a single sinusoid

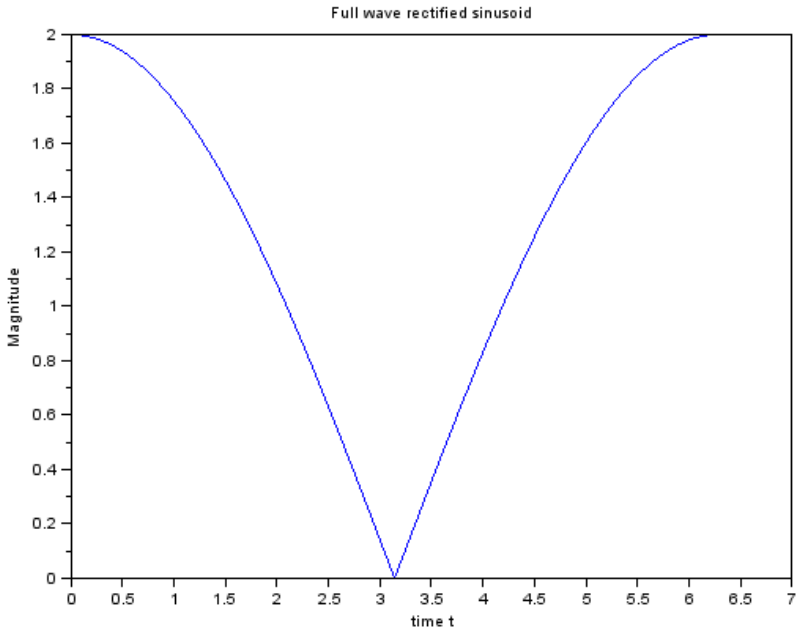

Figure 1.2: To express sum of two complex exponentials as a single sinusoid

```
14 xtitle('Full wave rectified sinusoid','time t','
     Magnitude');
```

Experiment: 2

Perform linear convolution sum

Scilab code Solution 2.1 Perform linear convolution sum

```
1  // To Perform linear convolution sum
2  //scilab 5.4.1 ;64 bit(windows 8)
3  clear;
4  close;
5  clc;
6  h = [0,0,1,1,1,0,0];
7  N1 = -2:4;
8  x = [0,0,0.5,2,0,0,0];
9  N2 = -2:4;
10 y = convol(x,h);
11 for i = 1:length(y)
12   if (y(i)<=0.0001)
13     y(i)=0;
14   end
15 end
16 N = -4:8;
17 subplot(3,1,1)
18 a=gca();
19 plot2d3('gnn',N1,h)
20 xtitle('Impulse Response','n','h[n]');
21 a.thickness = 2;
```

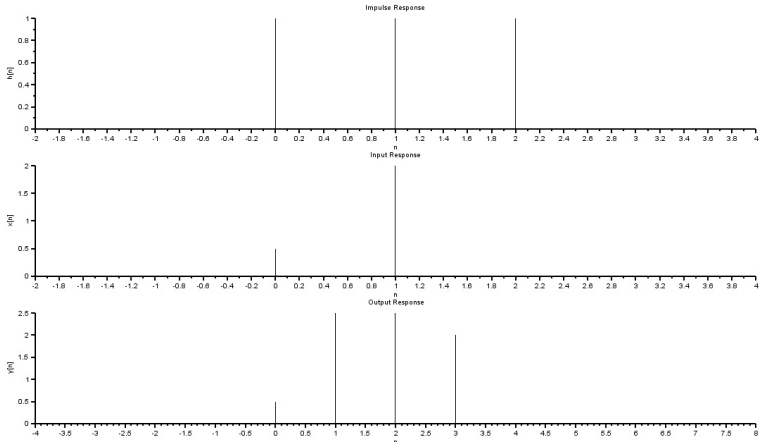

Figure 2.1: Perform linear convolution sum

```
22 subplot(3,1,2)
23 a=gca();
24 plot2d3('gnn',N2,x)
25 xtitle('Input Response','n','x[n]');
26 a.thickness = 2;
27 subplot(3,1,3)
28 a=gca();
29 plot2d3('gnn',N,y)
30 xtitle('Output Response','n','y[n]');
31 a.thickness = 2;
```

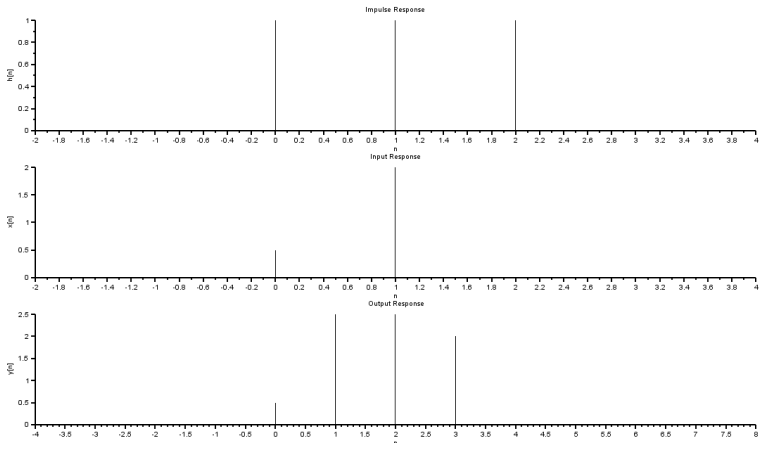

Figure 2.2: Perform linear convolution sum

Experiment: 3

Convolution integral of finite duration signals

Scilab code Solution 3.1 convolution integral of finite duration signals

```
1  //Convolution Integral of fintie duration signals
2  //scilab 5.4.1 ;64 bit(windows 8)
3  clear;
4  close;
5  clc;
6  T = 10;
7  x = ones(1,T);  //Input Response
8  for t = 1:2*T
9    h(t) = t-1;    //Impulse Response
10 end
11 N1 = 0:length(x)-1;
12 N2 = 0:length(h)-1;
13 y = convol(x,h);
14 N = 0:length(x)+length(h)-2;
15 subplot(3,1,1)
16 a=gca();
17 a.x_location="origin";
18 plot2d(N2,h)
19 xtitle('Impulse Response','t','h(t)');
```

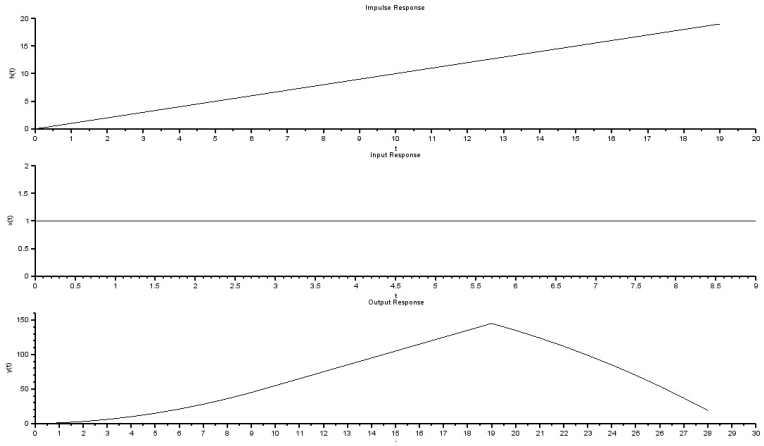

Figure 3.1: convolution integral of finite duration signals

```
20 a.thickness = 2;
21 subplot(3,1,2)
22 a=gca();
23 plot2d(N1,x)
24 xtitle('Input Response','t','x(t)');
25 a.thickness = 2;
26 subplot(3,1,3)
27 a=gca();
28 plot2d(N,y)
29 xtitle('Output Response','t','y(t)');
30 a.thickness = 2;
```

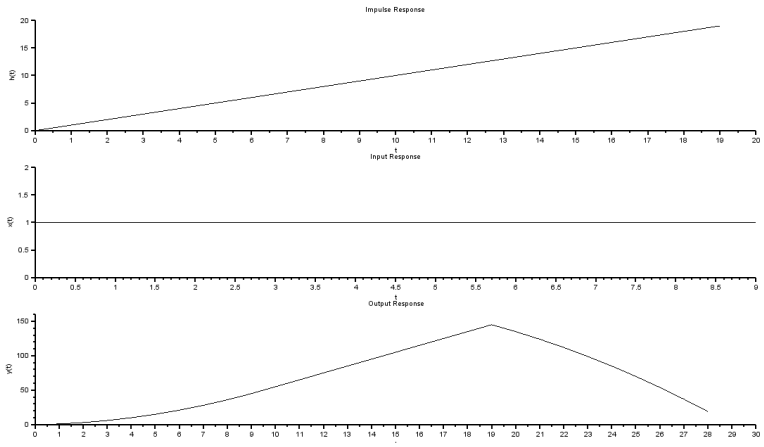

Figure 3.2: convolution integral of finite duration signals

Experiment: 4

Convolution sum of finite duration sequences

Scilab code Solution 4.1 convolution sum of finite duration sequences

```
1  //Convolution Sum of finite duration sequences
2  //scilab 5.4.1 ;64 bit(windows 8)
3  clear;
4  close;
5  clc;
6  x = ones(1,5);
7  N1 =0:length(x)-1;
8  Alpha = 1.4;     //alpha > 1
9  for n = 1:7
10   h(n)= (Alpha^(n-1))*1;
11 end
12 N2 =0:length(h)-1;
13 y = convol(x,h);
14 N = 0:length(x)+length(h)-2;
15 subplot(3,1,1)
16 a=gca();
17 plot2d3('gnn',N2,h)
18 xtitle('Impulse Response','n','h[n]');
19 a.thickness = 2;
```

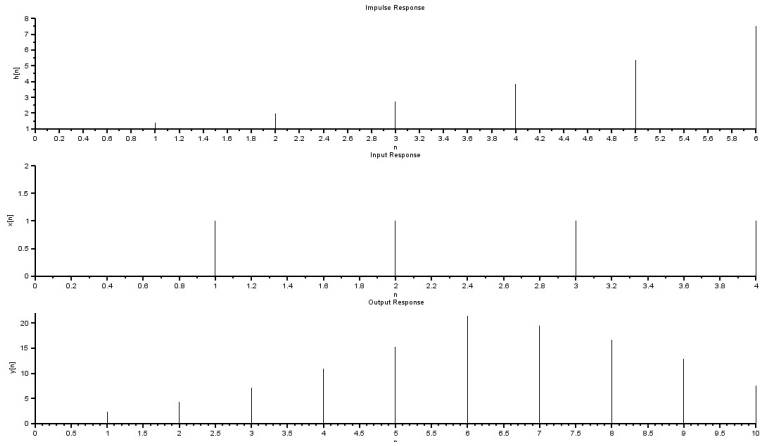

Figure 4.1: convolution sum of finite duration sequences

```
20 subplot(3,1,2)
21 a=gca();
22 plot2d3('gnn',N1,x)
23 xtitle('Input Response','n','x[n]');
24 a.thickness = 2;
25 subplot(3,1,3)
26 a=gca();
27 plot2d3('gnn',N,y)
28 xtitle('Output Response','n','y[n]');
29 a.thickness = 2;
```

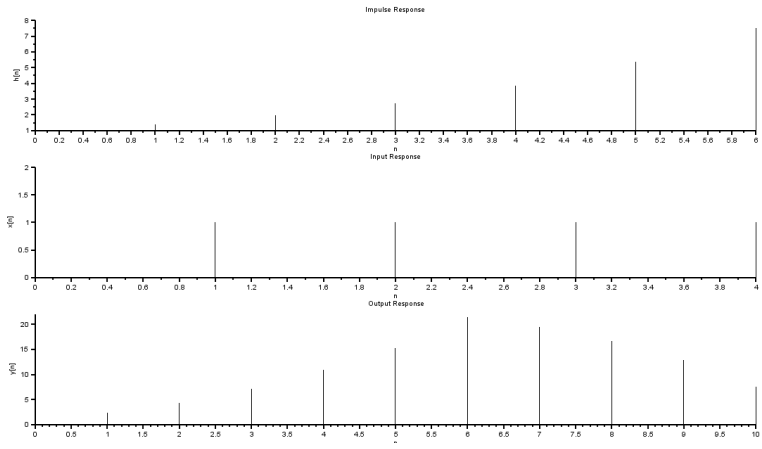

Figure 4.2: convolution sum of finite duration sequences

Experiment: 5

Frequency Response of Ideal Low pass Filter X (jW) = 1

Scilab code Solution 5.1 Frequency Response of Ideal Low pass Filter

```
1 //Frequency Response of Ideal Low pass Filter ,X(jW)=
      1
2 //scilab 5.4.1 ;64 bit(windows 8)
3 clear;
4 clc;
5 close;
6 Wc = 10;     //1 rad/sec
7 W  = -Wc:0.1:Wc; //Passband of filter
8 HW0 = 1; //Magnitude of Filter
9 HW = HW0*ones(1,length(W));
10 //Inverse Continuous-time Fourier Transform
11 t = -%pi:%pi/length(W):%pi;
12 Dw = 0.1;
13 ht =(1/(2*%pi))*HW *exp(sqrt(-1)*W'*t)*Dw;
14 ht = real(ht);
```

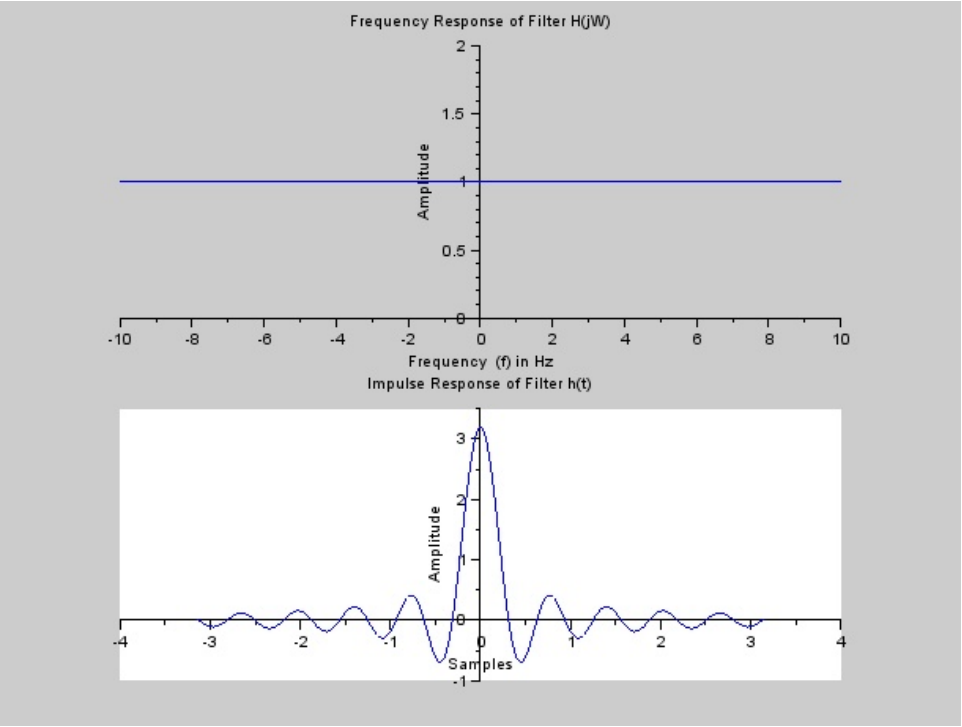

Figure 5.1: Frequency Response of Ideal Low pass Filter

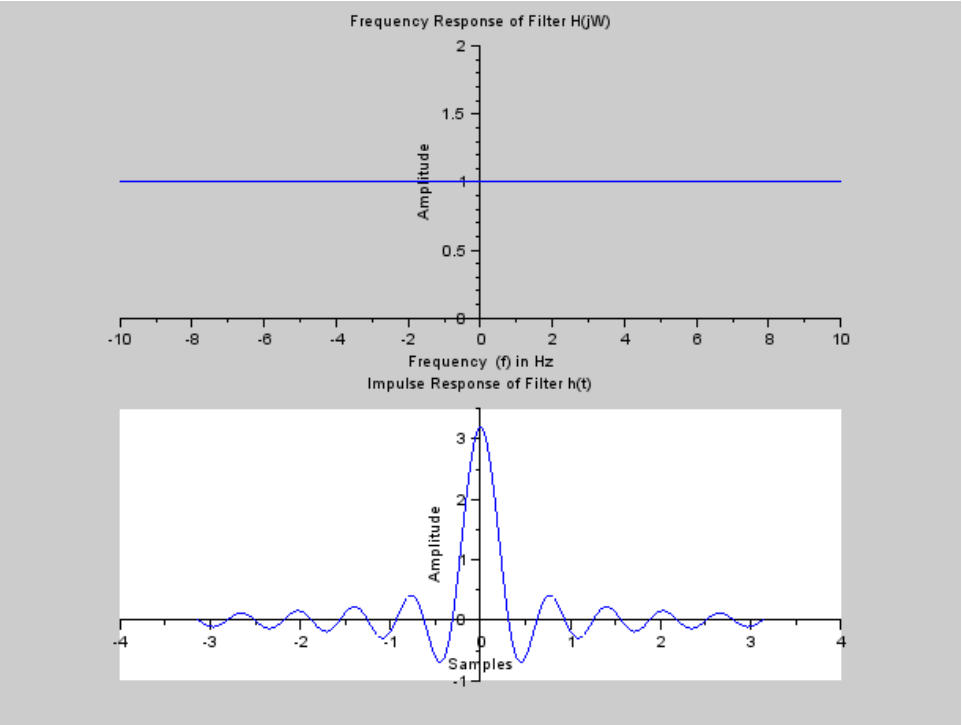

Figure 5.2: Frequency Response of Ideal Low pass Filter

```
15 subplot(2,1,1)
16 a = gca();
17 a.y_location ="origin";
18 a.x_location ="origin";
19 plot(W,HW);
20 xtitle('Frequency Response of Filter H(jW)')
21 xlabel('Frequency (f) in Hz');
22 ylabel('Amplitude');
23 subplot(2,1,2)
24 a = gca();
25 a.y_location ="origin";
26 a.x_location ="origin";
27 plot(t,ht);
28 xtitle('Impulse Response of Filter h(t)')
29 xlabel('Samples');
30 ylabel('Amplitude');
```