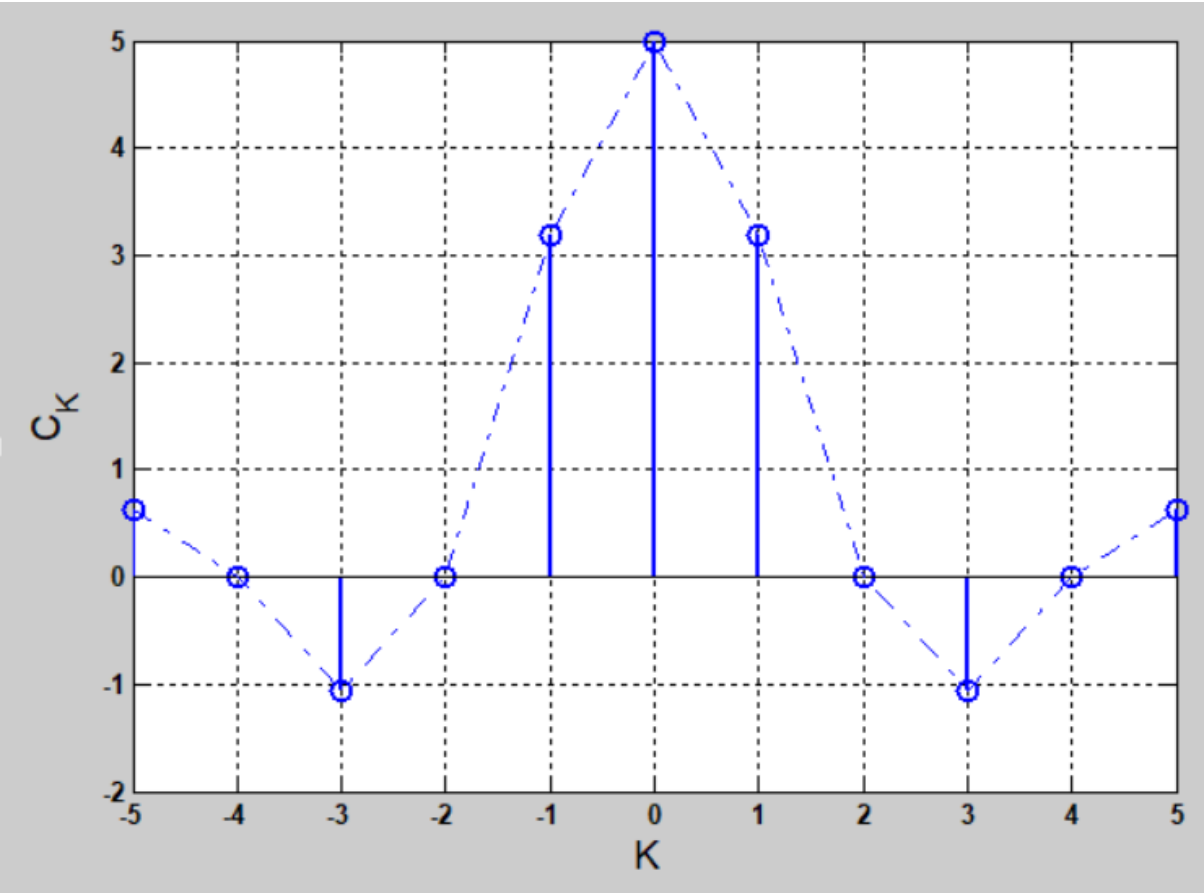
MATLAB Example of creating a square wave from its frequency components

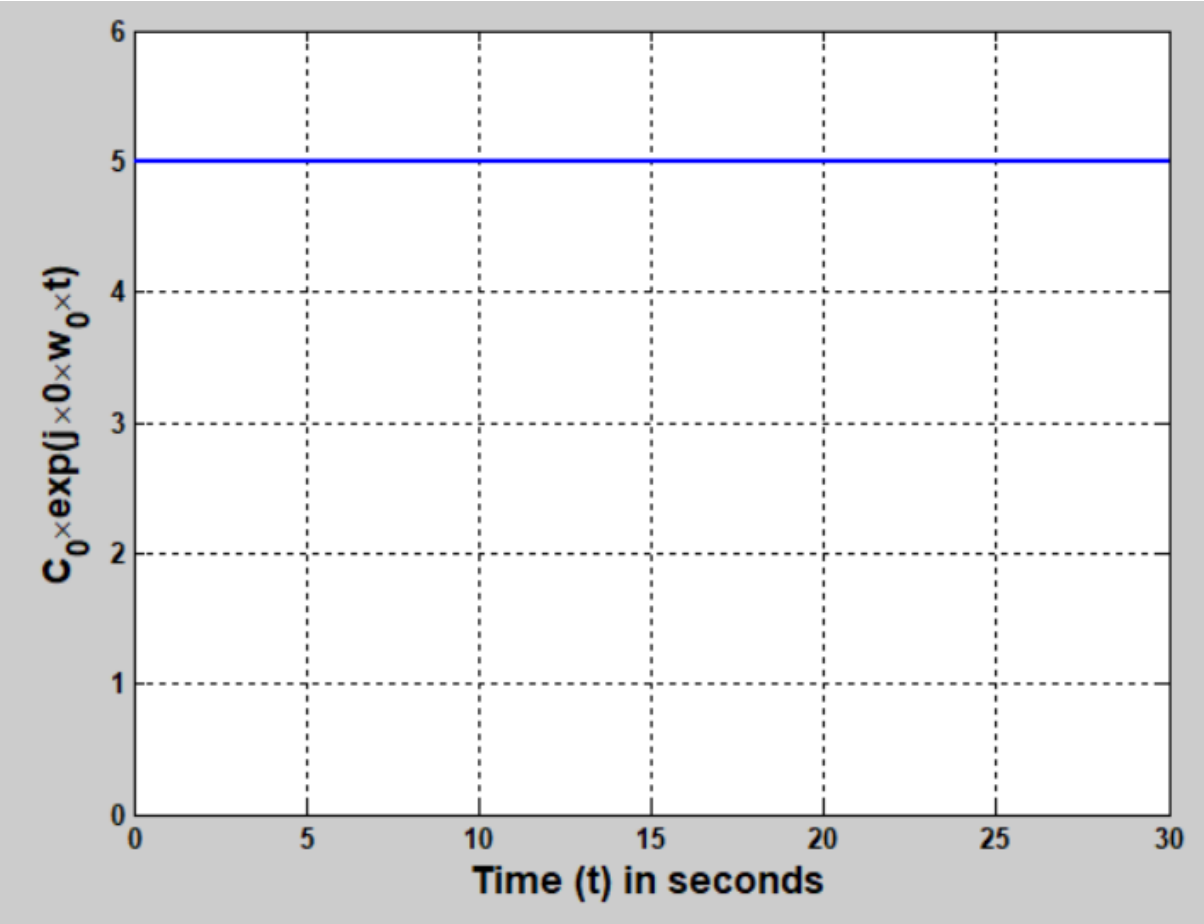
```
K = [-5:1:5];
A = 10;
CK = (A./(K*pi)) .* sin(K*pi/2);
CK
```

```
CK =

  Columns 1 through 10

    0.6366   -0.0000   -1.0610    0.0000
3.1831    5.0000    3.1831    0.0000   -
1.0610   -0.0000

  Column 11

    0.6366
```

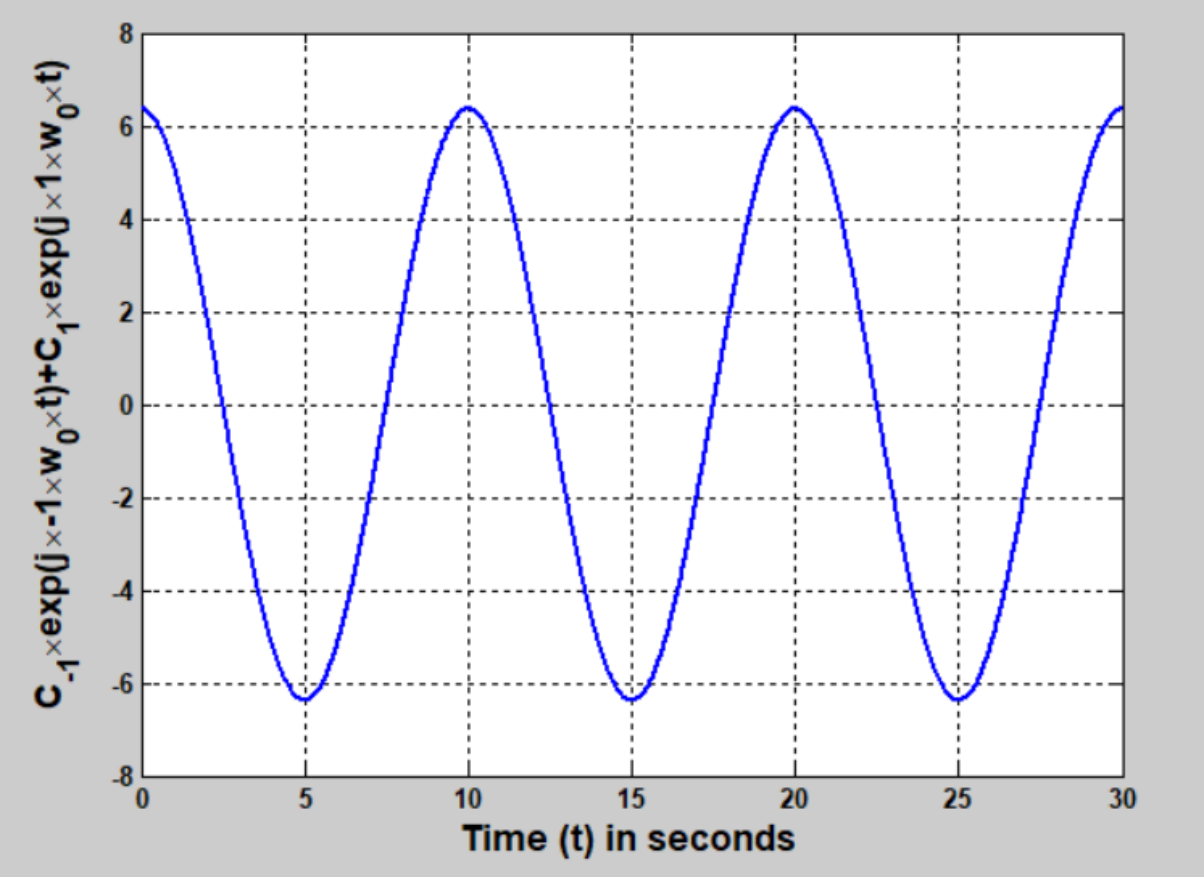
```
stem(K,CK);
pause;
```


5
4
3
2
1
0
-1
-2
C_K
-5
-4
-3
-2
-1
0
1
2
3
4
5
K

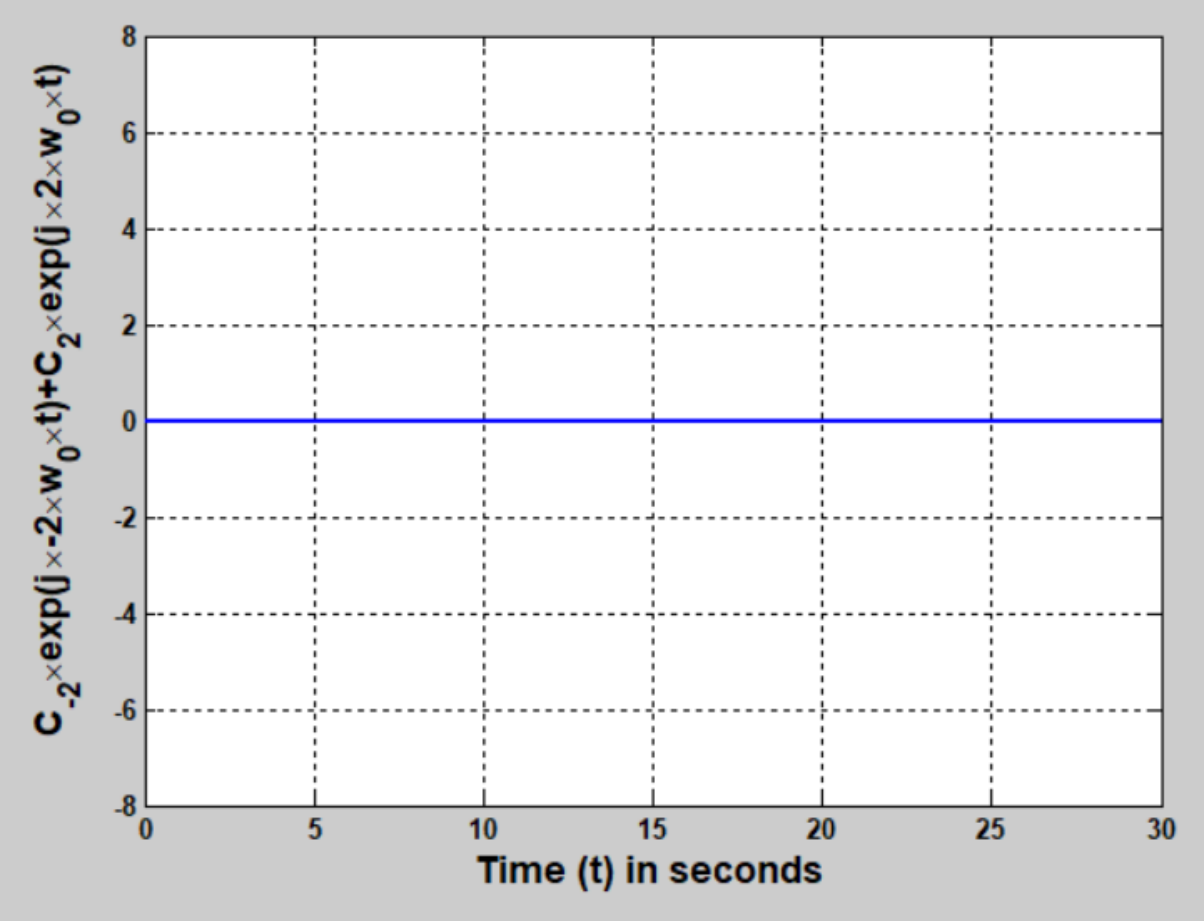
```
%% Inverse fourier series components one by one
T0 = 10;
t = [0:0.01:30];
xt_0freq_Component = CK(6)*exp(j*0*(2*pi/T0)*t);
plot(t,xt_0freq_Component)
```



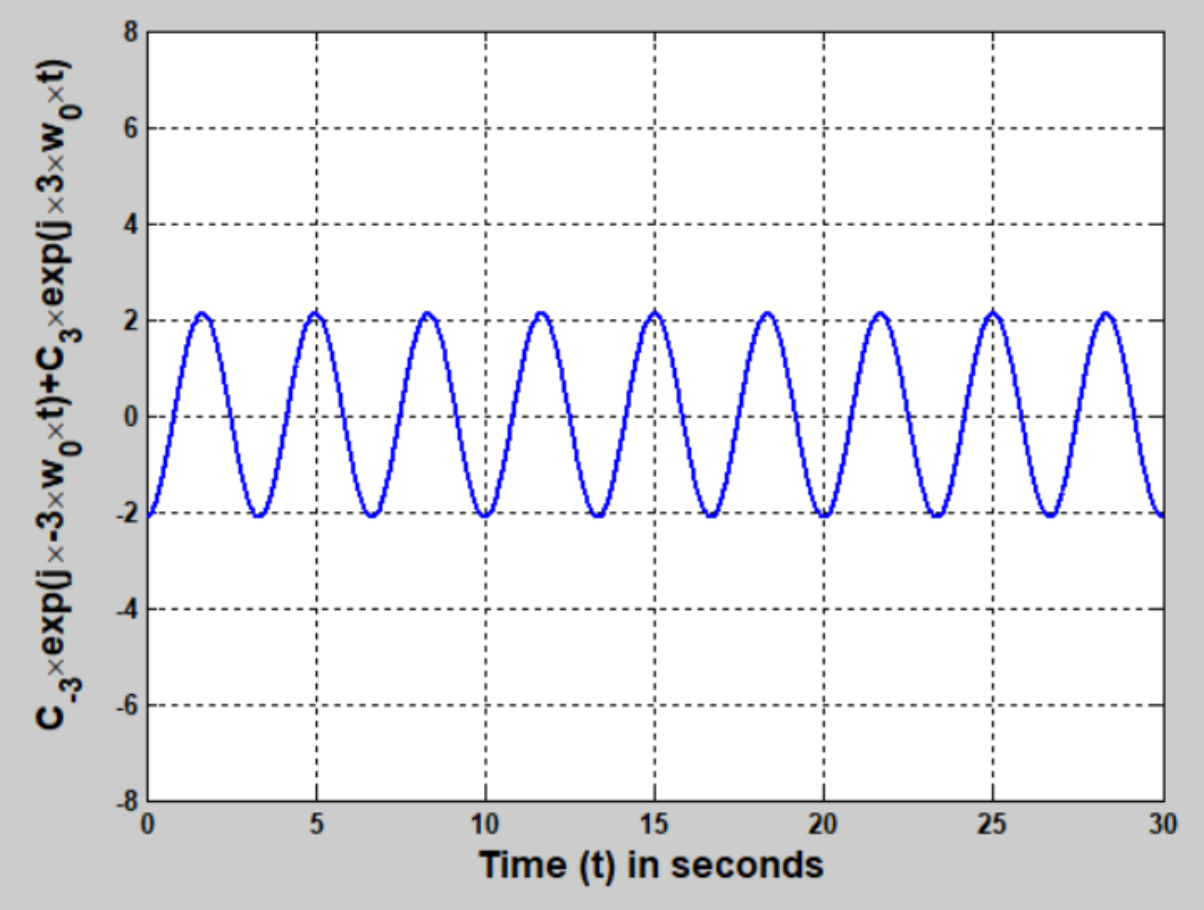
```
xt_plus_minus_w0_Component = CK(5)*exp(j*(-
1)*(2*pi/T0)*t)+ CK(7)*exp(j*(1)*(2*pi/T0)*t);
plot(t,xt_plus_minus_w0_Component);
pause
```



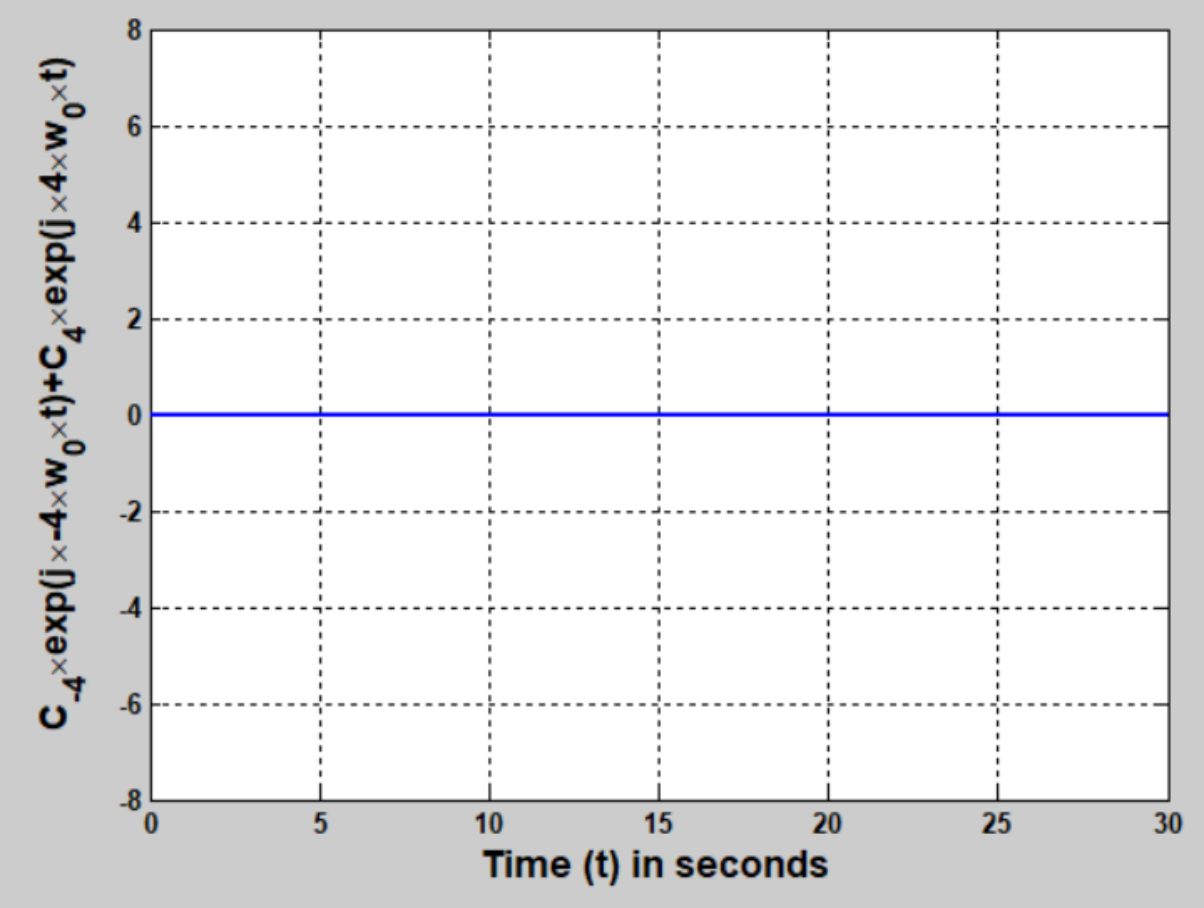
```
xt_plus_minus_2w0_Component = CK(4)*exp(j*(-
2)*(2*pi/T0)*t)+ CK(8)*exp(j*(2)*(2*pi/T0)*t);
plot(t,xt_plus_minus_2w0_Component);
pause
```



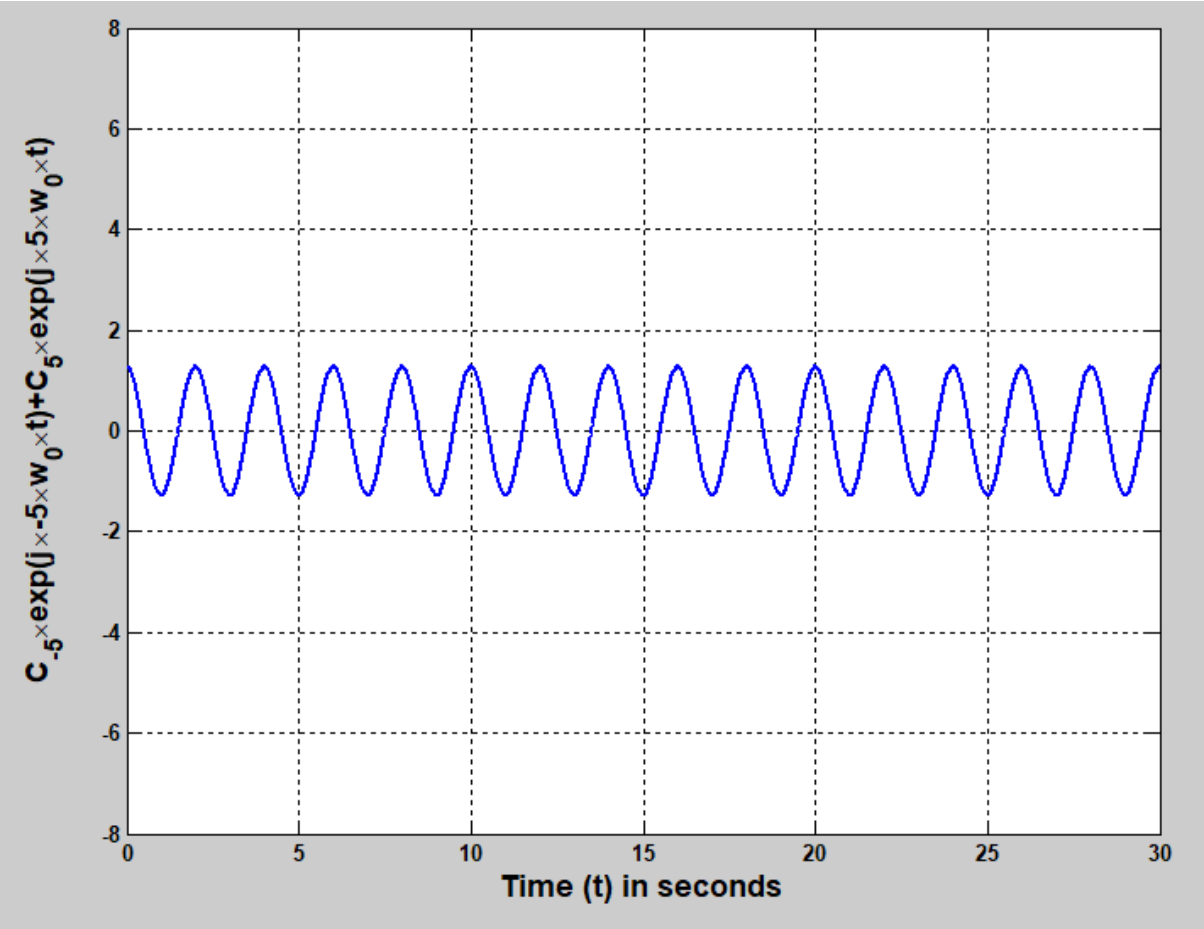
```
xt_plus_minus_3w0_Component = CK(3)*exp(j*(-
3)*(2*pi/T0)*t)+ CK(9)*exp(j*(3)*(2*pi/T0)*t);
plot(t,xt_plus_minus_3w0_Component);
pause
```



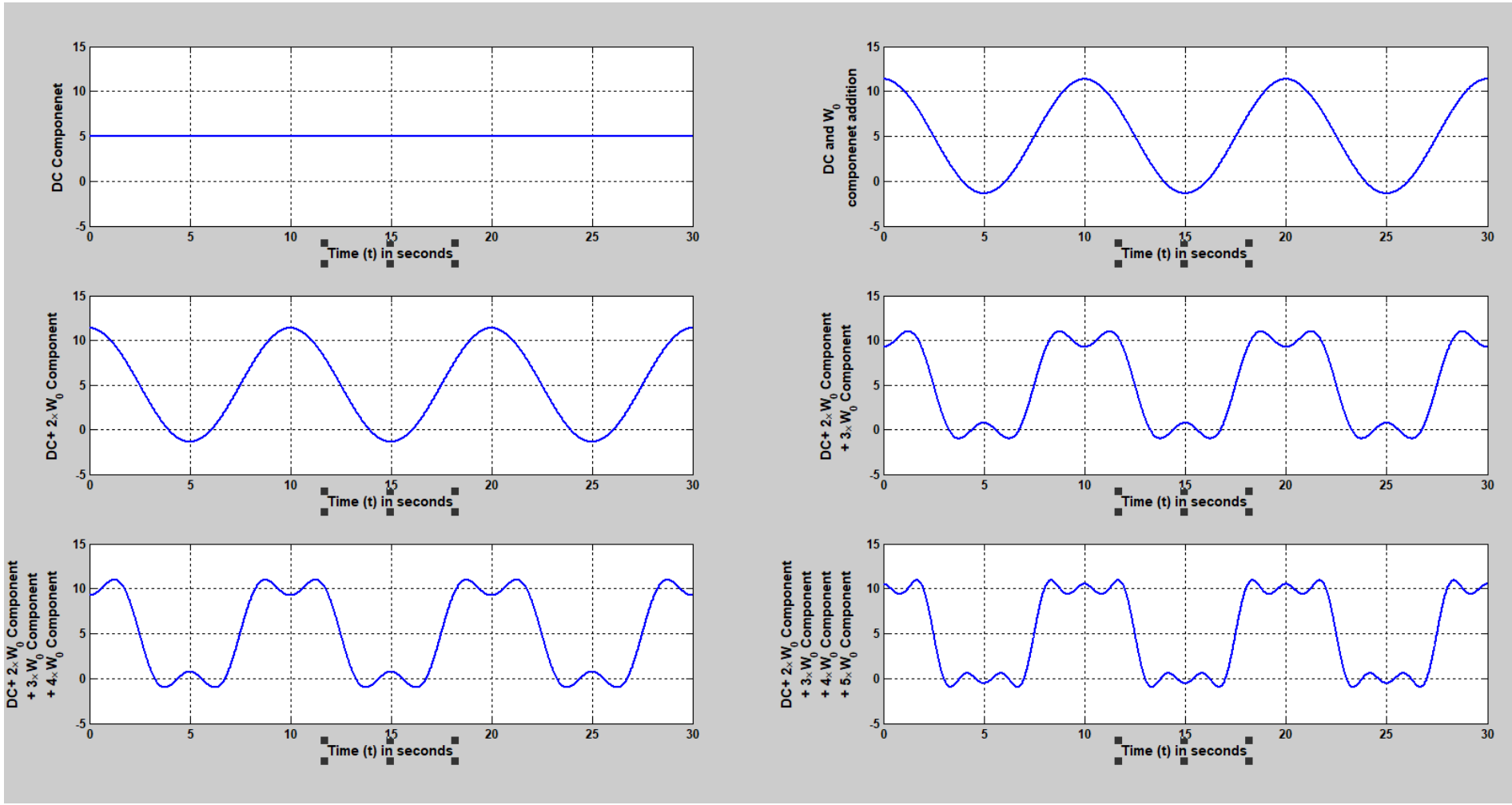
```
xt_plus_minus_4w0_Component = CK(2)*exp(j*(-
4)*(2*pi/T0)*t)+ CK(10)*exp(j*(4)*(2*pi/T0)*t);
plot(t,xt_plus_minus_4w0_Component);
pause
```



```
xt_plus_minus_5w0_Component = CK(1)*exp(j*(-
5)*(2*pi/T0)*t)+ CK(11)*exp(j*(5)*(2*pi/T0)*t);
plot(t,xt_plus_minus_5w0_Component);
pause
```



```
%% Inverse fourier series components compiled one
step at a time
%Just the DC
subplot(3,2,1);
plot(t, xt_0freq_Component);

% The 0,w0 component addition
subplot(3,2,2);
plot(t,
xt_0freq_Component+xt_plus_minus_w0_Component)

% The 0,w0, 2w0 component addition
subplot(3,2,3);
plot(t,
xt_0freq_Component+xt_plus_minus_w0_Component+xt_plus
_minus_2w0_Component)

% The 0,w0, 2w0, 3w0 component addition
subplot(3,2,4);
plot(t,
xt_0freq_Component+xt_plus_minus_w0_Component+xt_plus
_minus_2w0_Component+xt_plus_minus_3w0_Component)

% The 0,w0, 2w0, 4w0 component addition
subplot(3,2,5);
plot(t,
xt_0freq_Component+xt_plus_minus_w0_Component+xt_plus
_minus_2w0_Component+xt_plus_minus_3w0_Component+xt_p
lus_minus_4w0_Component)

% The 0,w0, 2w0, 4w0,5w0 component addition
subplot(3,2,6);
plot(t,
xt_0freq_Component+xt_plus_minus_w0_Component+xt_plus
_minus_2w0_Component+xt_plus_minus_3w0_Component+xt_p
lus_minus_4w0_Component+xt_plus_minus_5w0_Component)
```


DC Componenet
DC and W0 componenet addition
DC+ 2x W0 Component
DC+ 2x W0 Component + 3x W0 Component
DC+ 2x W0 Component + 3x W0 Component + 4x W0 Component
DC+ 2x W0 Component + 3x W0 Component + 4x W0 Component + 5x W0 Component
Time (t) in seconds