2020301926 路为民

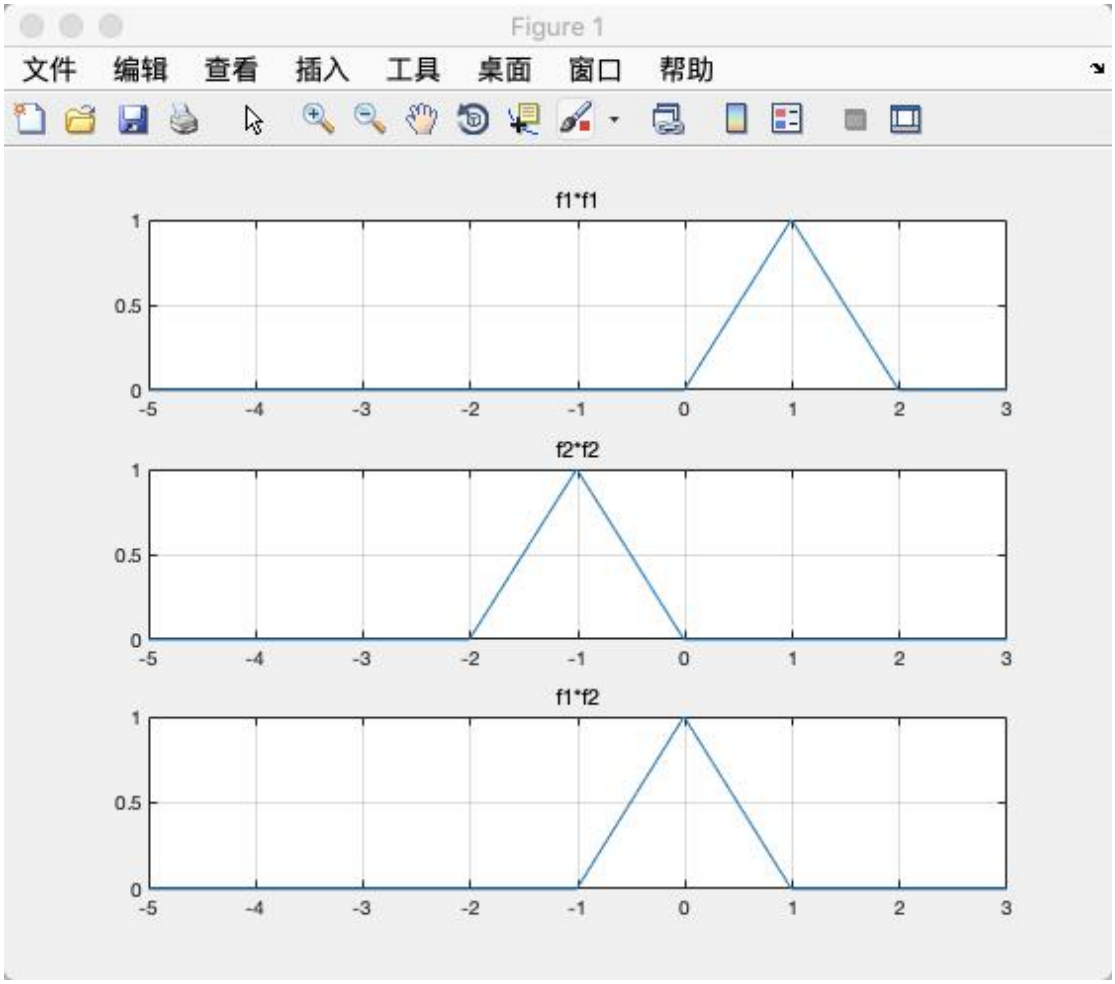
1、已知两信号$f_1(t) = u(t) - u(t-1), f_2(t) = u(t+1) - u(t)$

求卷积积分$g_1(t) = f_1(t) * f_1(t), g_2(t) = f_2(t) * f_2(t), g_3(t) = f_1(t) * f_2(t)$,，并绘制信号波形。

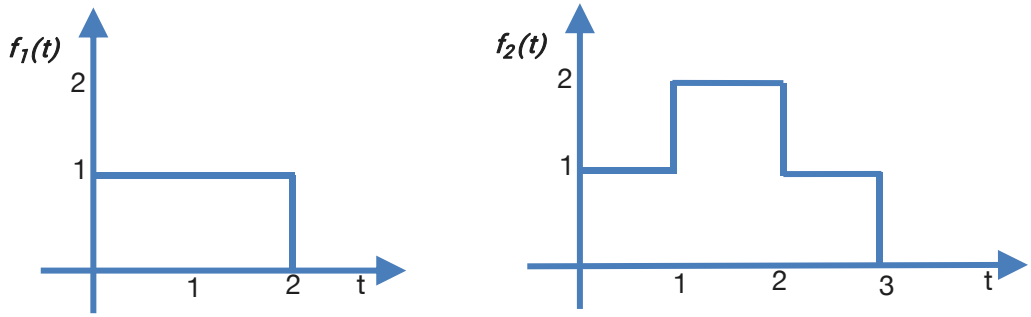
（1）程序源码

```
delta = 0.01;
t = -5:delta:5;

f1 = stepfun(t,0) - stepfun(t,1);
f2 = stepfun(t,-1) - stepfun(t,0);

g1 = conv(f1,f1)*delta;
g2 = conv(f2,f2)*delta;
g3 = conv(f1,f2)*delta;

n1 = length(g1);
n2 = length(g2);
n3 = length(g3);

t_g1 = (0:n1-1)*delta-10;
t_g2 = (0:n2-1)*delta-10;
t_g3 = (0:n3-1)*delta-10;

subplot(3,1,1)
plot(t_g1,g1);
axis([-5,3,0,1]);
title('f1*f1')
grid on;

subplot(3,1,2)
plot(t_g2,g2);
axis([-5,3,0,1]);
title('f2*f2')
grid on;

subplot(3,1,3)
plot(t_g3,g3);
axis([-5,3,0,1]);
title('f1*f2')
grid on;
```

（2）图像展示



2、用 MATLAB 命令绘出下列信号的卷积积分$f_1(t) * f_2(t)$的时域波形图。

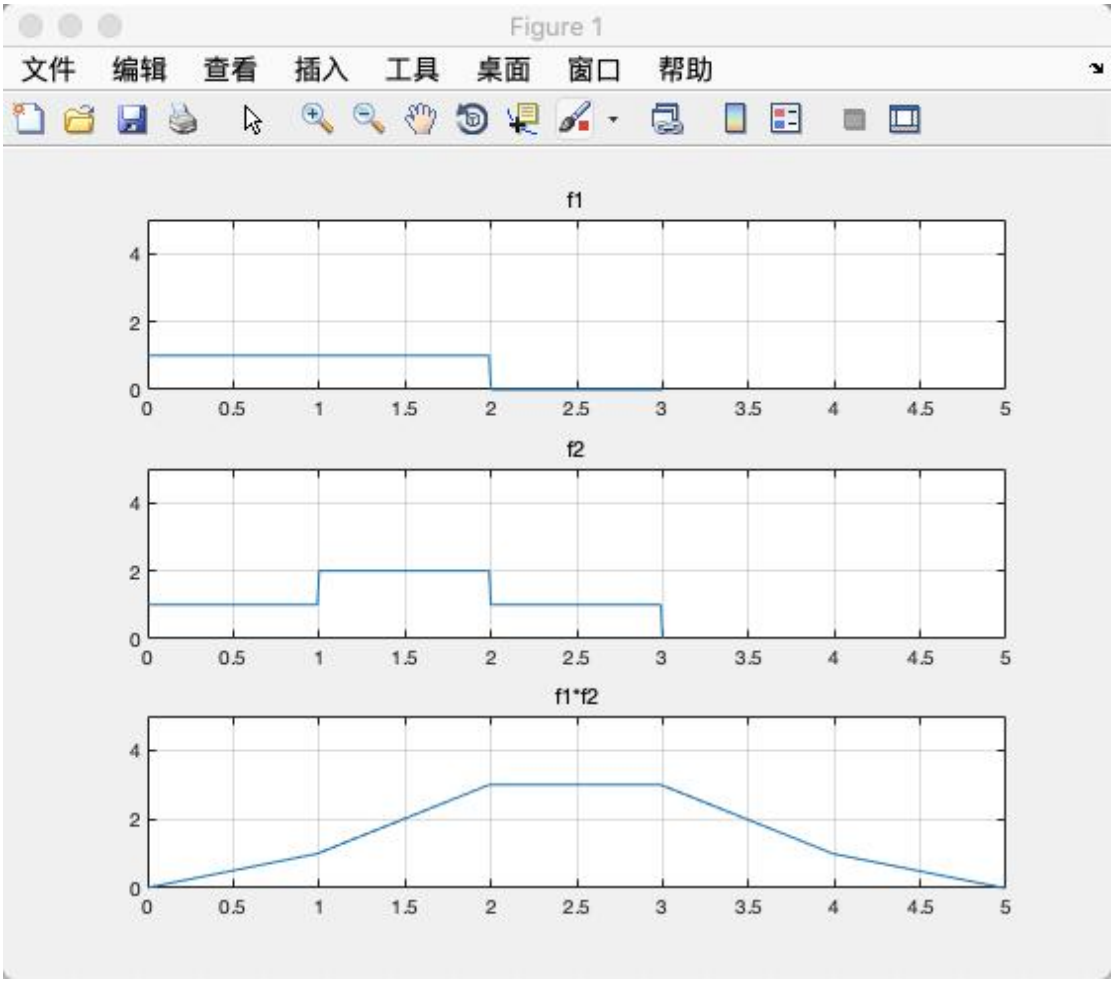


(1)程序源码

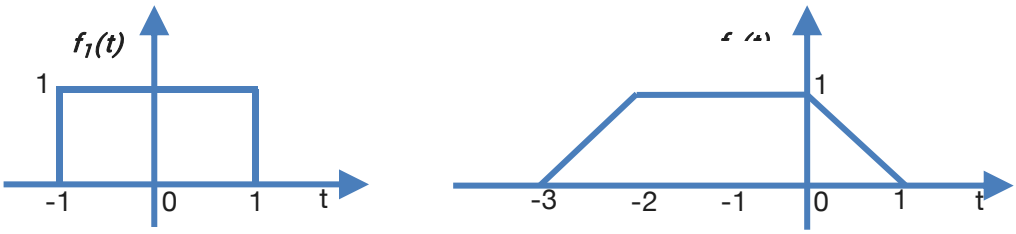
```
delta = 0.01;
t = 0:delta:3;

f1 = stepfun(t,0) - stepfun(t,2);
f2 = stepfun(t,0) + stepfun(t,1) - stepfun(t,2) - stepfun(t,3);
```

```
y = conv(f1,f2)*delta;

n = length(y);
t_y = (0:n-1)*delta;

subplot(3,1,1)
plot(t,f1);
axis([0,5,0,5]);
title('f1')
grid on;

subplot(3,1,2)
plot(t,f2);
axis([0,5,0,5]);
title('f2')
grid on;

subplot(3,1,3)
plot(t_y,y);
axis([0,5,0,5]);
title('f1*f2')
grid on;
```

（3）图像展示



3、用 MATLAB 命令绘出下列信号的卷积积分$f_1(t) * f_2(t)$的时域波形图。

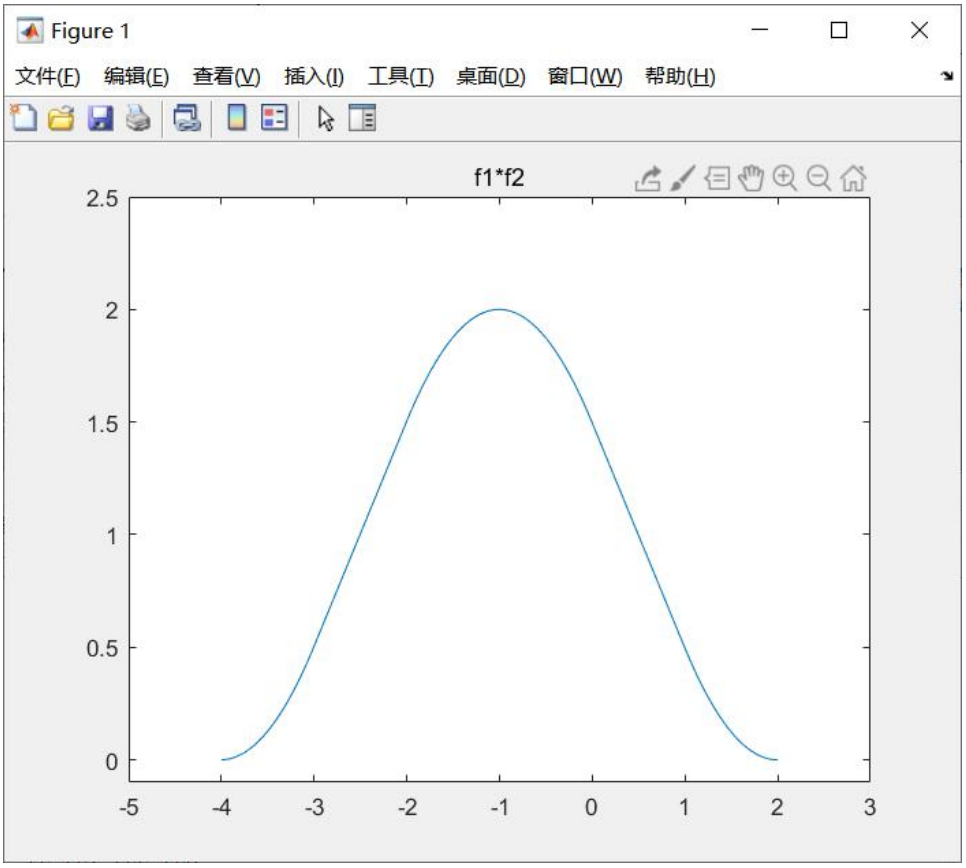


（1）程序源码

```
delta=0.01;
t1=-1:delta:1;
f1=stepfun(t1,-1)-stepfun(t1,1);
t2=-3:delta:1;
t3=0:delta:4;
t4=-4:delta:0;
f21=t3.*(stepfun(t2,-3)-stepfun(t2,-2));
f22=stepfun(t2,-2)-stepfun(t2,0);
f23=(-t4).*stepfun(t2,0);
```

```
f2=f21+f22+f23;
y=conv(f1,f2)*delta;
n=length(y);
t_y=(0:n-1)*delta-4;
plot(t_y,y),axis([-5,3,-0.1,2.5]),title('f1*f2')
```

（2）图像展示



4、已知两信号$f_1(t) = (t-1)[u(t-1) - u(t-3)]$, $f_2(t) = u(t+1) - 2u(t-2)$，

求卷积积分 g(t) = $f_1(t) * f_2(t)$，同时绘制信号波形。

(1)程序源码

```
delta = 0.01;
t = -2:delta:3;

f1 = (stepfun(t,1) - stepfun(t,3)).*(t-1);
f2 = stepfun(t,-1) - 2*stepfun(t,2);

y = conv(f1,f2)*delta;
```

```
n = length(y);
t_y = (0:n-1)*delta-4;

subplot(3,1,1)
plot(t,f1);
axis([-3,5,0,5]);
title('f1')
grid on;

subplot(3,1,2)
plot(t,f2);
axis([-2,5,-3,5]);
title('f2')
grid on;

subplot(3,1,3)
plot(t_y,y);
axis([-3,10,-3,5]);
title('f1*f2')
grid on;
```

（2）图像展示

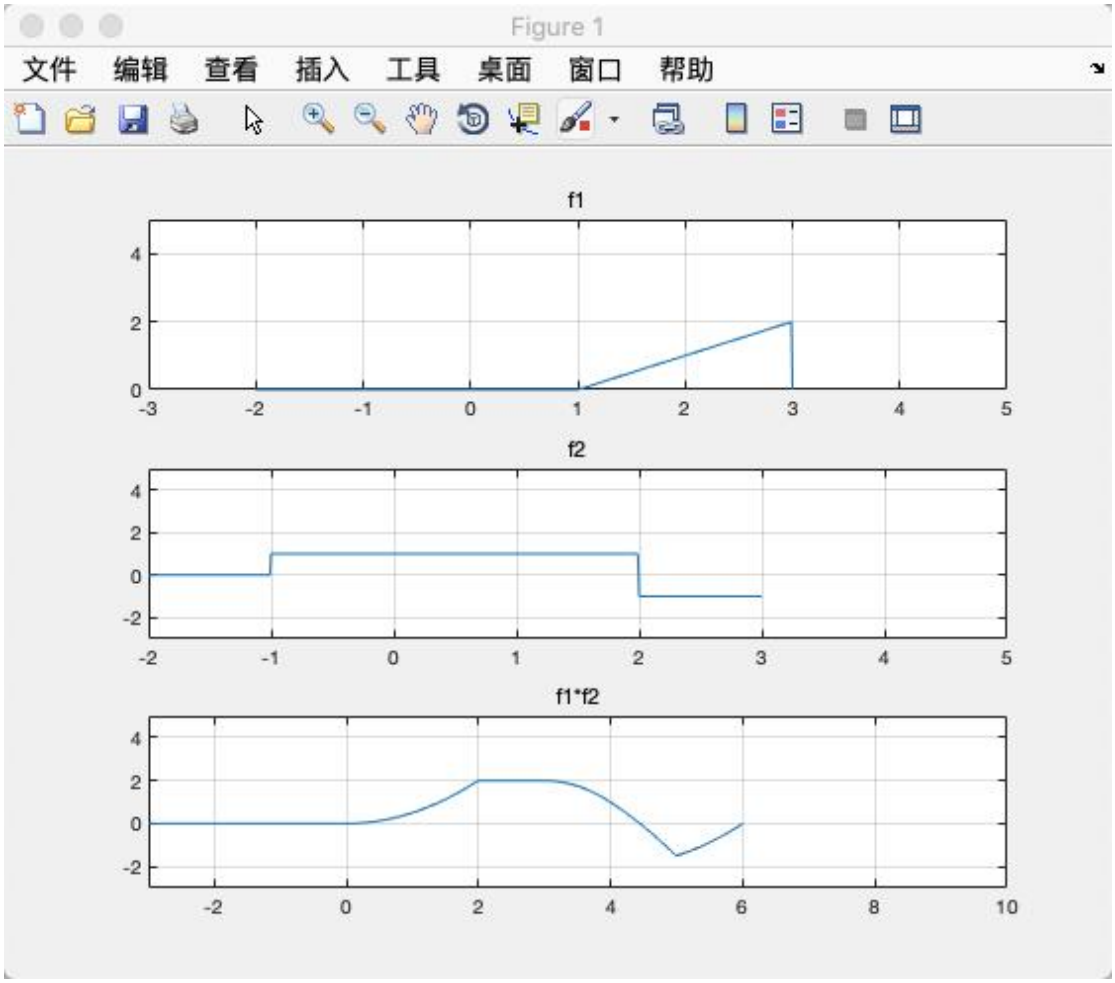


Figure 1
文件 编辑 查看 插入 工具 桌面 窗口 帮助
f1
f2
f1*f2