```
terms=[5 10 20 40 80 160 320 640]
```

```
terms =
     5    10    20    40    80   160   320   640
```

```
domain=cell(1,length(terms))
```

```
domain = 1×8 cell array
    []    []    []    []    []    []    []    []
```

```
parfor i=1:length(terms)
    domain(i)={rectangularPulse(-1:2/terms(i):1-2/terms(i))}
end
syms k
transform=[]
```

```
transform =

     []
```

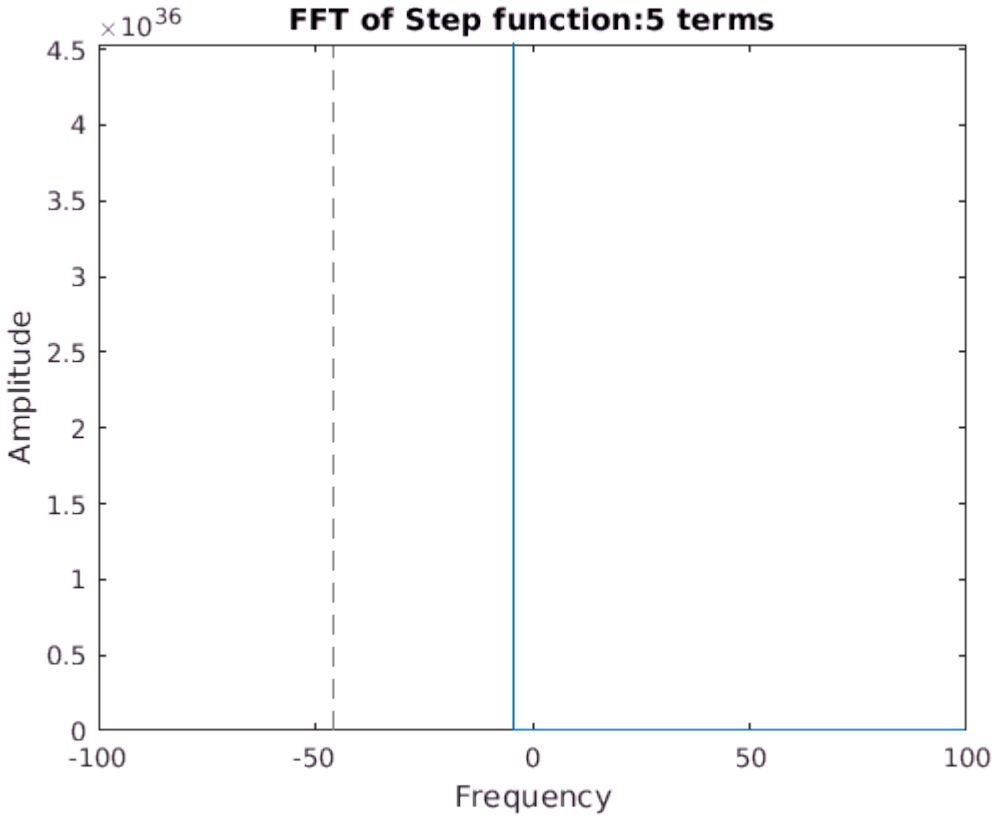
```
parfor i=1:length(domain)
    transform=[transform custom_fft(cell2mat(domain(i)),k)]
end
```

```
range =

     []


transform_ =

exp(-3*pi*(k - 1))/2 + exp(-9*pi*(k - 1)) + exp(-11*pi*(k - 1)) + exp(-21*pi*(k - 1)) + exp(-24*pi*(k -


range =

     []


transform_ =

exp(-4*pi*(k - 1)) + exp(-6*pi*(k - 1)) + exp(-(12*pi*(k - 1))/5) + exp(-(42*pi*(k - 1))/5) + exp(-(56*p


range =

     []


transform_ =

exp(-(12*pi*(k - 1))/5) + exp(-(24*pi*(k - 1))/5)


range =

     []


transform_ =
```

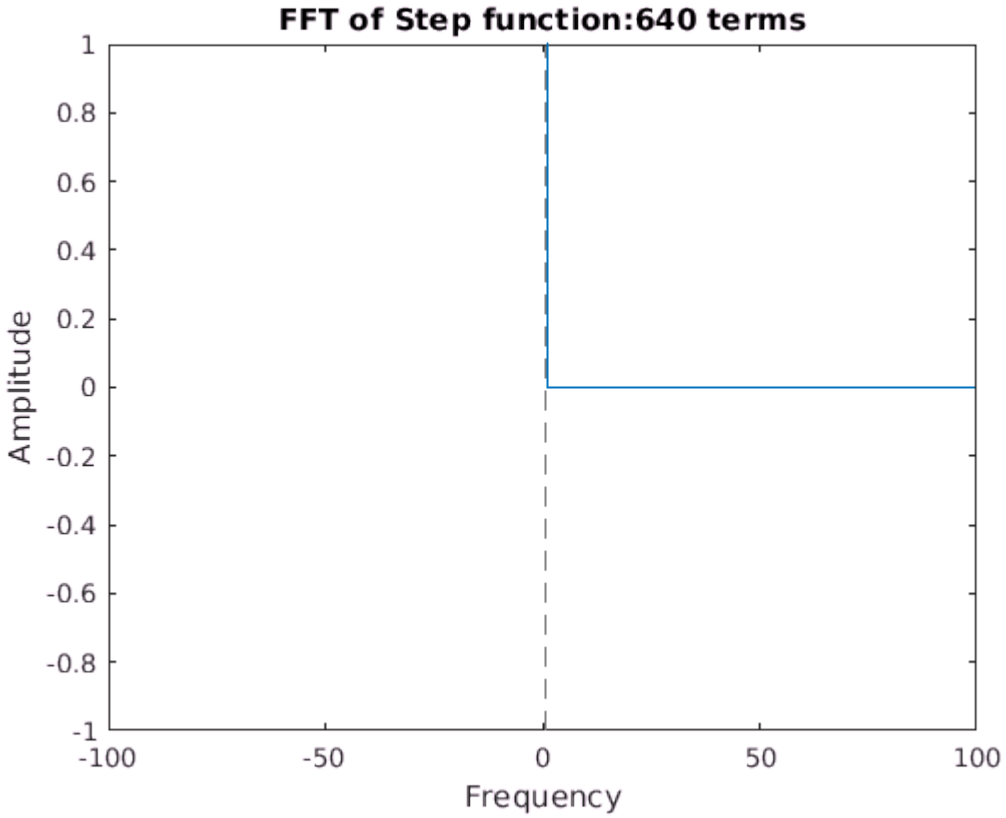
```
exp(-(41*pi*(k - 1))/2)/2 + exp(-52*pi*(k - 1)) + exp(-79*pi*(k - 1)) + exp(-(77*pi*(k - 1))/2) + exp(-8

range =

     []

transform_ =

exp(-15*pi*(k - 1)) + exp(-(21*pi*(k - 1))/2)/2 + exp(-39*pi*(k - 1)) + exp(-41*pi*(k - 1)) + exp(-(63*p

range =

     []

transform_ =

exp(-12*pi*(k - 1)) + exp(-(11*pi*(k - 1))/2)/2 + exp(-19*pi*(k - 1)) + exp(-21*pi*(k - 1)) + exp(-(21*p

range =

     []

transform_ =

exp(2967928573486663/2748779069440 - (2967928573486663*k)/2748779069440) + exp(2917518584622569/27487790

range =

     []

transform_ =

     ⋮
```

```
parfor i=1:length(transform)
    figure;fplot(transform(i),[-100,100])
end
```

```
fig=figure;
```




```
filename='animation.gif';
for i=1:length(transform)
    fplot(transform(i),[-100,100]);
    title(strcat('FFT of Step function:',string(terms(i)),' terms'));
    xlabel('Frequency');
    ylabel('Amplitude');
    drawnow;
    frame=getframe(fig);
    im=frame2im(frame);
    [imidx,cm]=rgb2ind(im,256);
    if i==1
        imwrite(imidx,cm,filename,'gif','Loopcount',inf);
    else
        imwrite(imidx,cm,filename,'gif','WriteMode','append');
    end
end
```




```
function transform_ = custom_fft(domain_,k_)
```

$$\text{transform\_} = \sum_{j=1}^{\text{length(domain\_)}} \text{domain\_}(j) \exp \frac{-2\pi i\,(j-1)(\text{k\_}-1)}{\text{length(domain\_)}}$$

```
range=[]
parfor i=1:length(domain_)
    range=[range domain_(i)*exp(-2*pi*i*(i-1)*(k_-1)/length(domain_))]
end
transform_=sum(range)
end
```