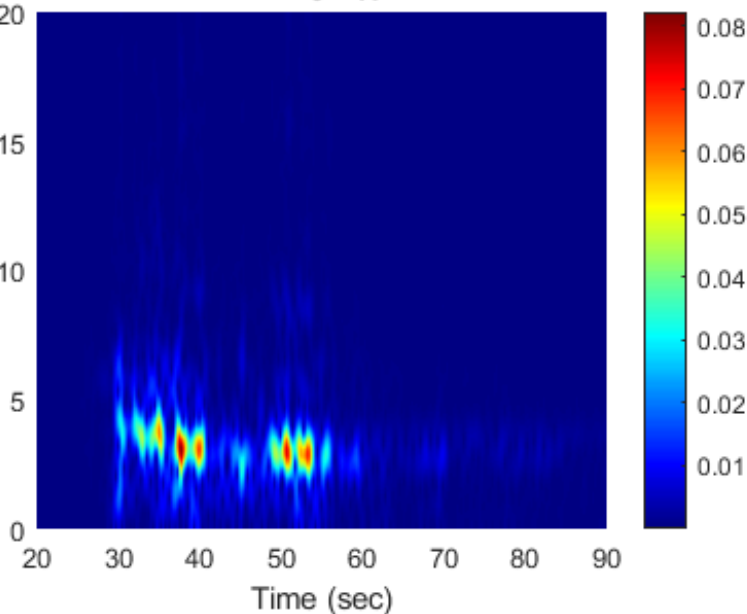


```
function [fps,ps] = PhysicalSpectrum(t,y,sigma,winlen)
y = y-mean(y);
SR = round(1/(t(2)-t(1)));
pt = length(t);
tmp = (-winlen:(1/SR):winlen)';
wpt = length(tmp);
wfun = sqrt(2/(sqrt(2*pi)*sigma))*exp(-tmp.^2/sigma^2);
fps = SR*(1:wpt)'/wpt;
ps = zeros(wpt,pt);
for I = 1:pt
    idx1 = I-(wpt-1)/2;
    idx2 = idx1+wpt-1;
    if (idx1 <= 0)
        tmp = [flipud(y(1:(wpt-idx2)));y(1:idx2)];
        tmp = wfun.*tmp;
    elseif (idx1 > (pt-wpt+1))
        tmp = wpt-(pt-idx1+1);
        tmp = [y(idx1:end);flipud(y((pt-tmp+1):end))];
        tmp = wfun.*tmp;
    else
        tmp = wfun.*y(idx1:idx2);
    end
    ps(:,I) = abs(fft(tmp))/wpt*2;
end
end
```

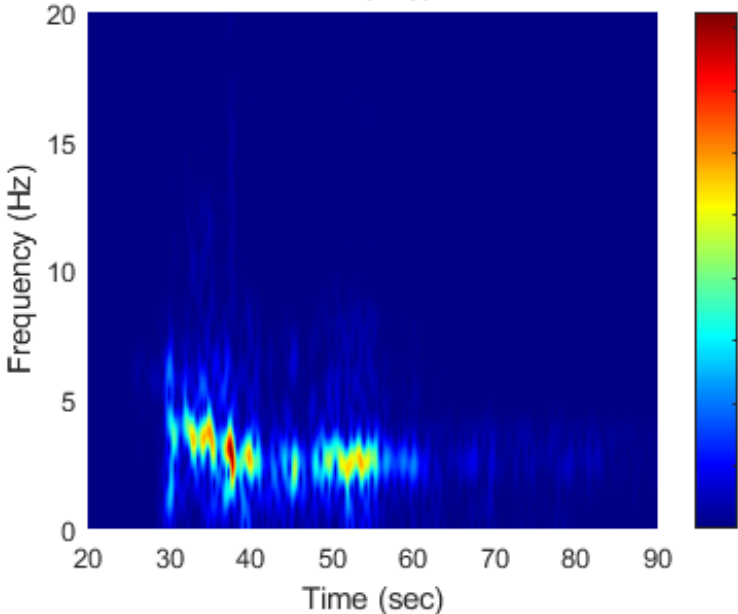
```
clc;clear;close all;
[num,txt,row] = xlsread('Homework-2 data set-RCF-Four Specimen Test Data.xlsx');
t = num(:,1);
dttitle = txt(1,[3,5,7,9]);
y = num(:,[3,5,7,9]);
% 下面兩行可調整參數
sigma = 4.0;
winlen = 5;
%
fps = cell(4,1);
ps = cell(4,1);
for i = 1:4
    [fps{i},ps{i}] = PhysicalSpectrum(t,y(:,i),sigma,winlen);
end
figure
for i = 1:4
    subplot(2,2,i);
    surf(t,fps{i},ps{i},'LineStyle','none','FaceLighting','phong');
    view(0,90),colormap('jet'),xlabel('Time (sec)'),ylabel('Frequency (Hz)');
    xlim([20,90]);
    ylim([0,20]);
    title(['Synthetic Time series Physical Spectrum',dttitle(i)]);
    colorbar;
    set(gcf,'Position',[50,50,1024,768]);
end
```

Sigma = 0.4

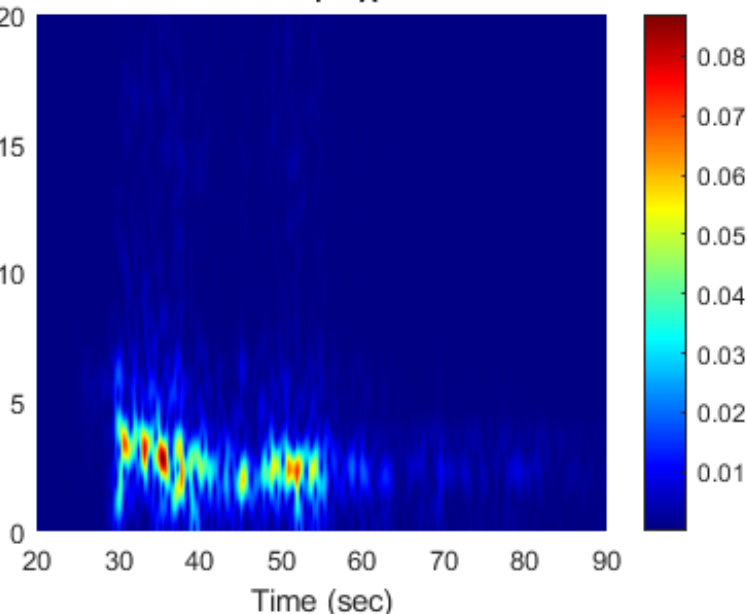
Synthetic Time series Physical Spectrum  
RCF6<sub>0</sub>60<sub>A</sub>04



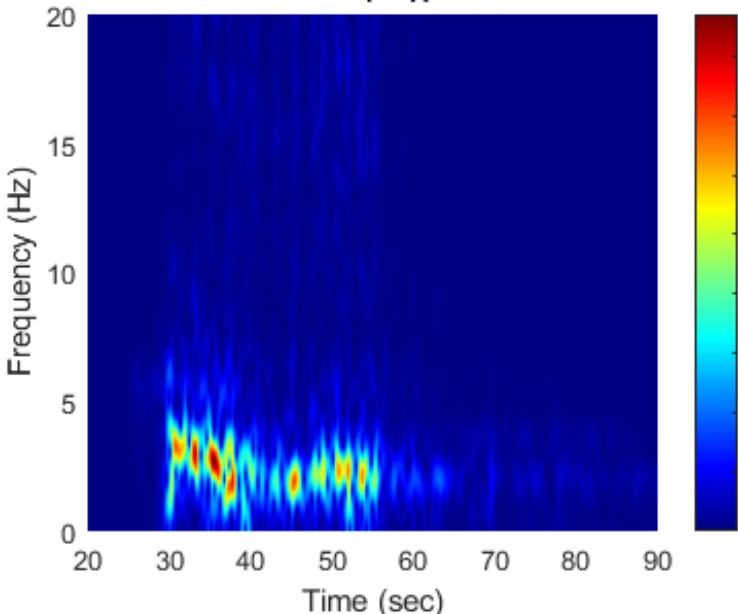
Synthetic Time series Physical Spectrum  
RCF2<sub>1</sub>00<sub>A</sub>04



Synthetic Time series Physical Spectrum  
RCF4<sub>1</sub>10<sub>A</sub>04

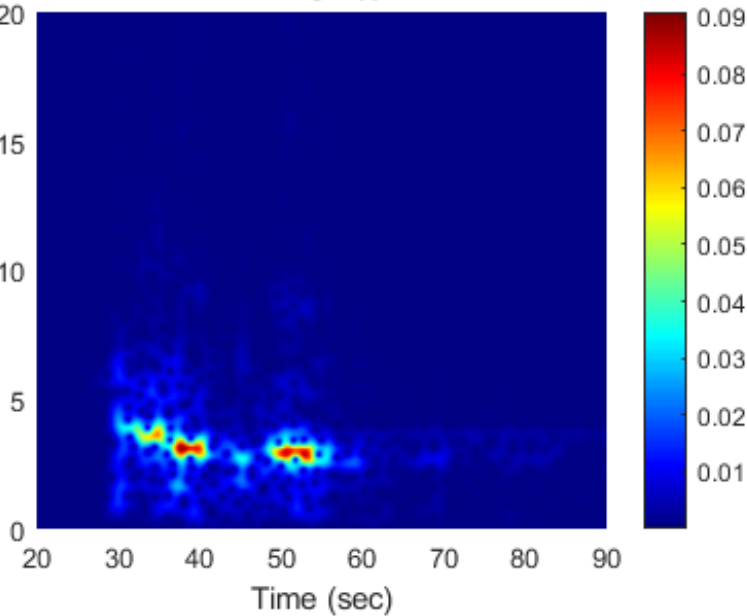


Synthetic Time series Physical Spectrum  
RCF3<sub>1</sub>20<sub>A</sub>04

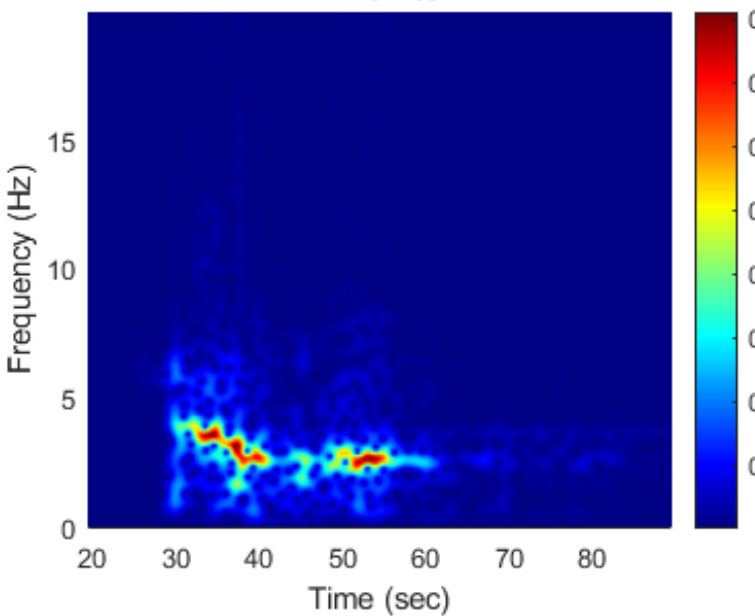


Sigma = 1.0

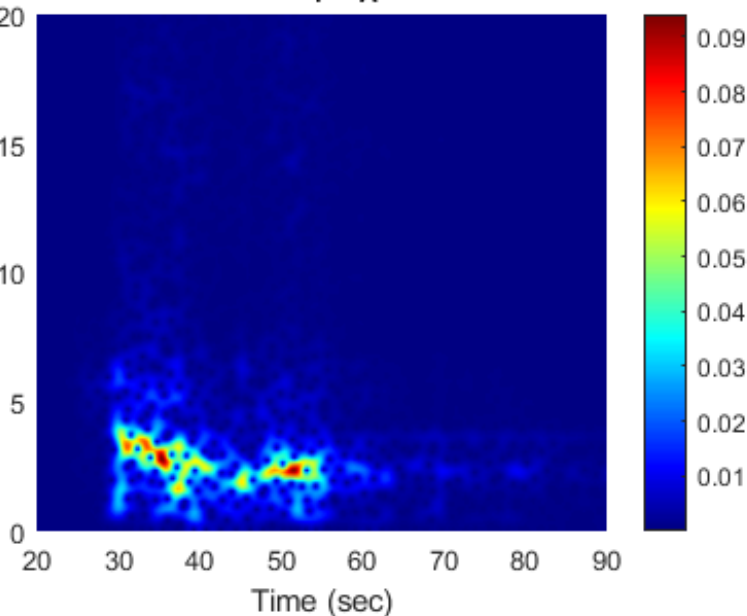
Synthetic Time series Physical Spectrum  
RCF6<sub>0</sub>60<sub>A</sub>04



Synthetic Time series Physical Spectrum  
RCF2<sub>1</sub>00<sub>A</sub>04



Synthetic Time series Physical Spectrum  
RCF4<sub>1</sub>10<sub>A</sub>04



Synthetic Time series Physical Spectrum  
RCF3<sub>1</sub>20<sub>A</sub>04

