Southwest Petroleum University
Experimental report

MATLAB programming and application

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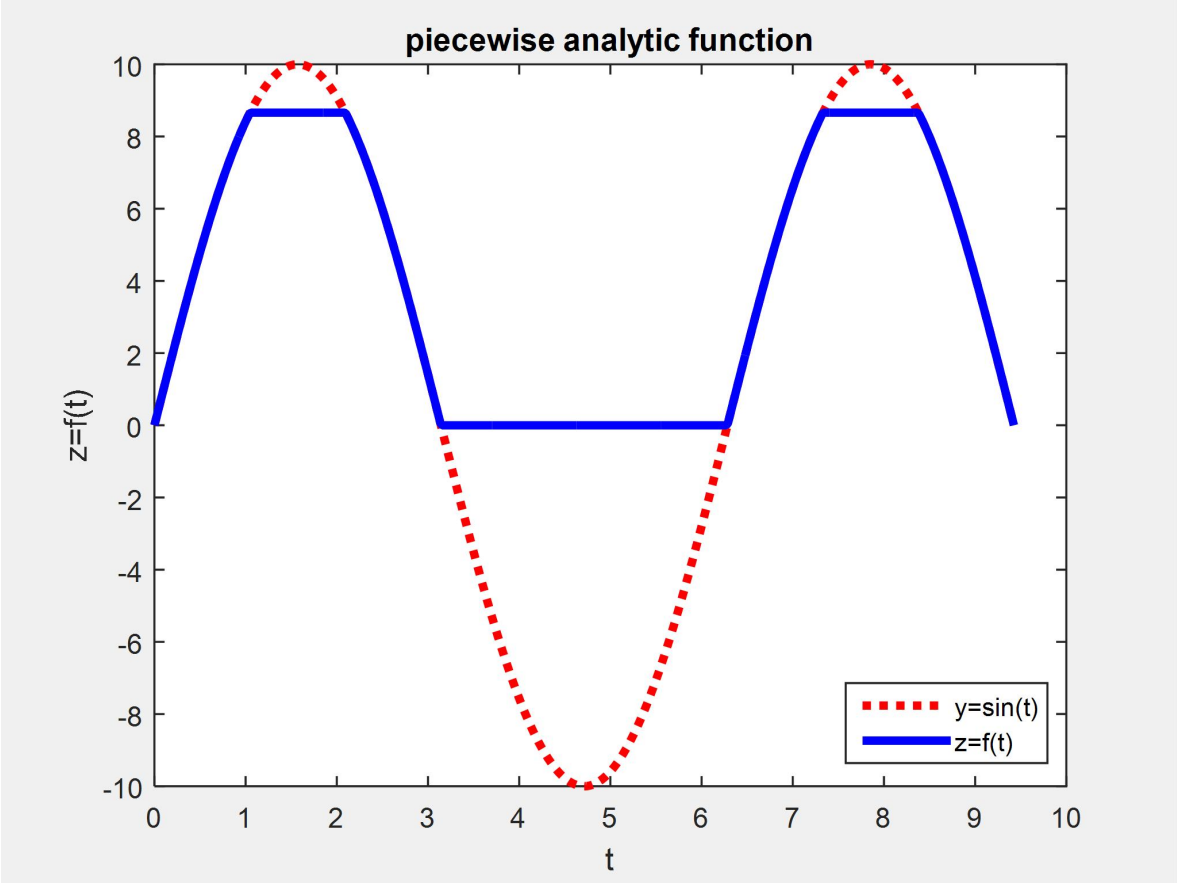
1. Calculation and expression of piece-wise analytic function.

The program:

```
t=linspace(0,3*pi,500);
% From 0 to 3*pi, 500 data are generated uniformly, assigned to t
y=10*sin(t); % produces a sine wave
z=(y>=0).*y; % sinusoidal fairing half-wave
a=10*sin(pi/3);
z=(y>=a)*a+(y<a).*z; % Clipped top of the sine rectifier half wave
plot(t,y,':r', 'LineWidth',3);hold on;plot(t,z,'-b', 'LineWidth',3)
 %The curve line is bolded to 3
xlabel('t'),ylabel('z=f(t)');
title('piecewise analytic function') ;
% Add horizontal, vertical, and titles to the graph
legend('y=sin(t)','z=f(t)') ; % Adds dimension text to the graphic
```

Result:

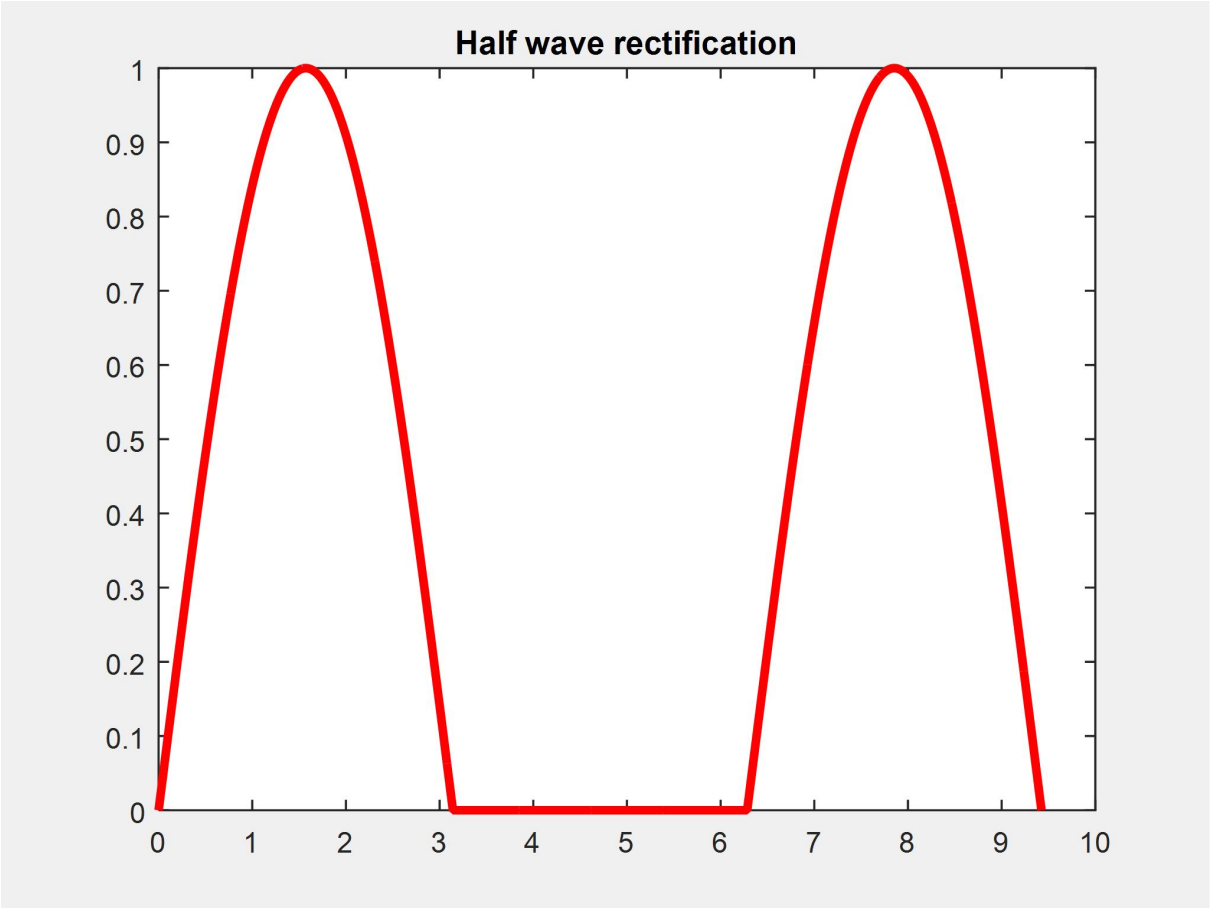


2. rectifier waveform description.

The program:

```
x=0:pi/200:3*pi;y=sin(x);%To making the plot
y1=(x<pi|x>2*pi).*y; plot(x,y1,'r', 'LineWidth',3);
%In the statement, 'x<pi|x>2*pi'
% indicates that x is less than pi or x is greater than 2pi, that is,
the negative half-wave waveform is eliminated
title('Half wave rectification')
```

Result:

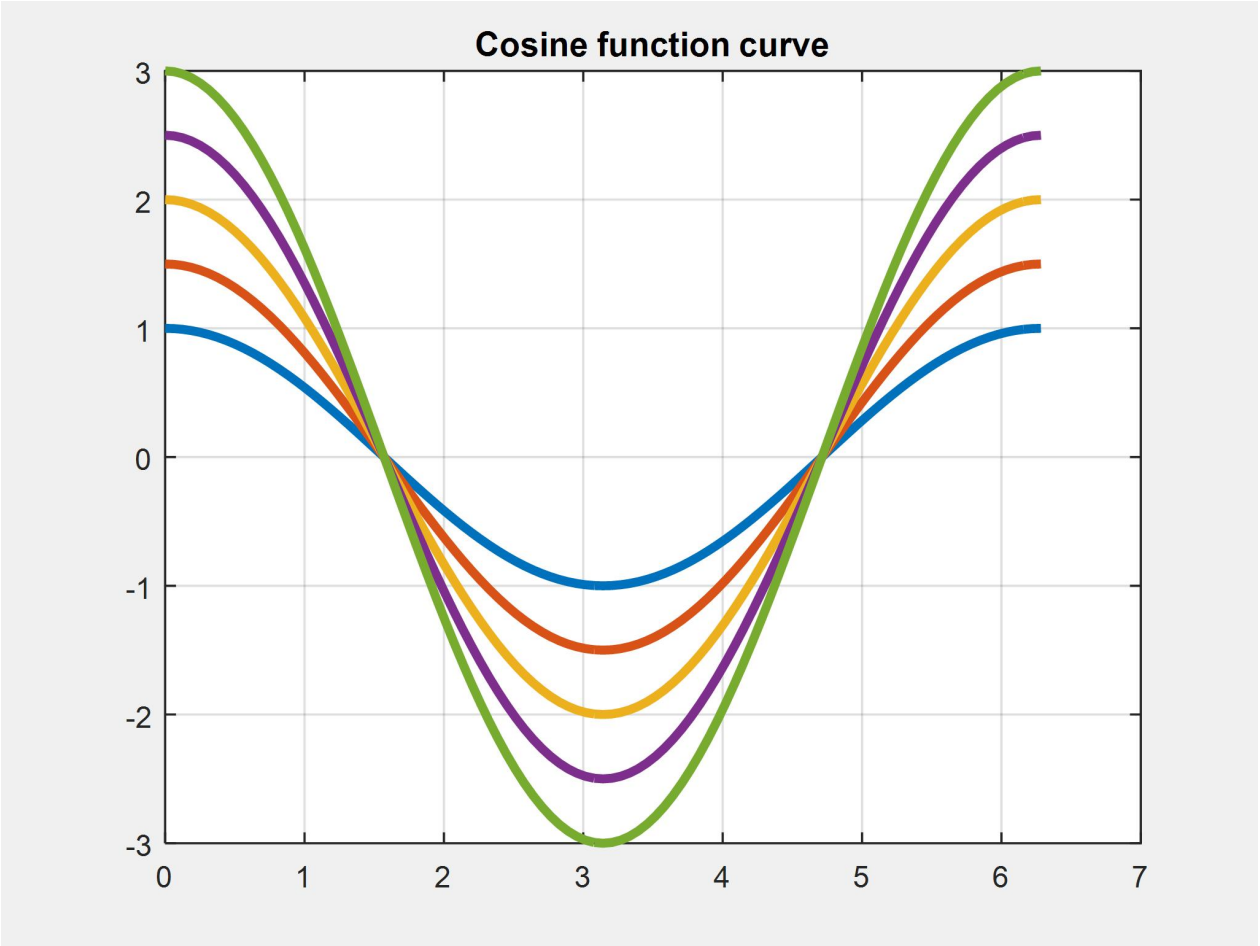


3 .Curve cluster description method.

The program:

```
t=(0:pi/50:2*pi)'; %notice the single quotation mark
k=1:0.5:3;Y=cos(t)*k;plot(t,Y, 'LineWidth',3) ;
title('Cosine function curve');
grid on
```

Result :

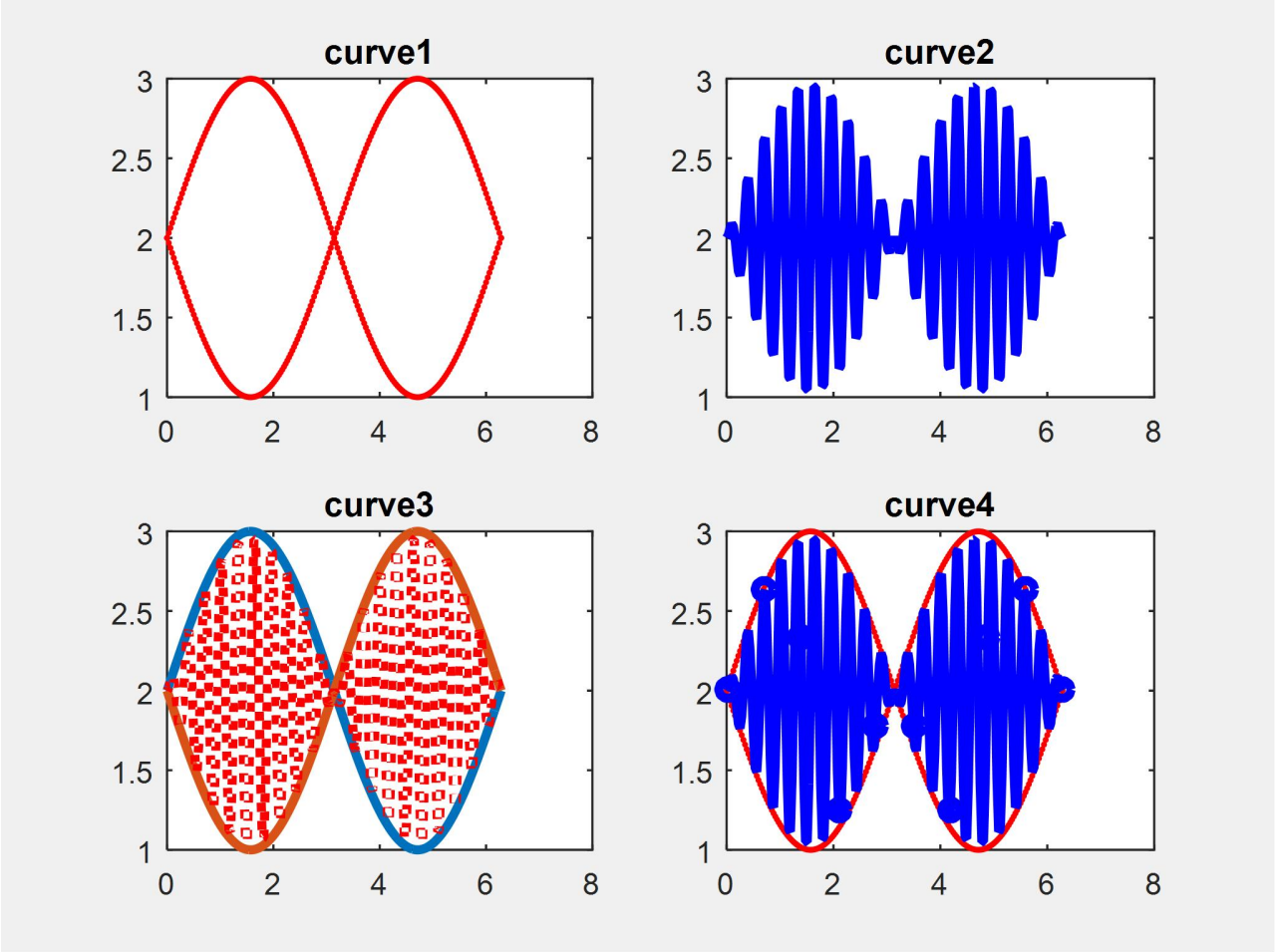


4.Modulation waveform description method.

The program:

```
% Generates the envelope of the modulated waveform
t1=(0:pi/100:2*pi)'; % Time sampling column vector with a length
of 201X1
y1=sin(t1)*[1,-1]+2; %Theenvelope function value, which is the
matrix of (201X2).
t2=t1;
y2=sin(t2).*sin(20*t2)+2; % Modulated wave column vector with a
length of 201X1
t3=2*pi*(0:9)/9;
y3=sin(t3).*sin(20*t3)+2;
subplot(221),plot(t1,y1,'r.', 'LineWidth',3),title('curve1')
subplot(222),plot(t2,y2,'b', 'LineWidth',3),title('curve2')
subplot(223),plot(t1,y1,t2,y2,'r:',
'LineWidth',3),title('curve3')
subplot(224),plot(t1,y1,'r.',t2,y2,'b',t3,y3,'bo',
'LineWidth',3),title('curve4') ;
```

Result :



5. The half wave of rectifying sine with cutting off the top.

The program:

```
t=linspace(0,3*pi,600);y=100*sin(t); %sine wave
z1=((t<pi)|(t>2*pi)).*y; %The half wave of rectification
w=((t>pi/3&t<2*pi/3)+(t>7*pi/3&t<8*pi/3)); %top-cutting range
w_n=~w;
z2=w*100*sin(pi/3)+w_n.*z1; % the final wave
subplot(1,3,1),plot(t,y,'r:', 'LineWidth',3),ylabel('y');
title('Sine wave')
subplot(1,3,2),plot(t,z1,'b:', 'LineWidth',3),
xlabel('t'),axis([0 10 -100 100]);
title('Rectification half wave curve')
subplot(1,3,3),plot(t,z2,'g-', 'LineWidth',3),axis([0 10 -100
100]);
title('Half wave curve of rectifier with cutting off top')
```

Result: