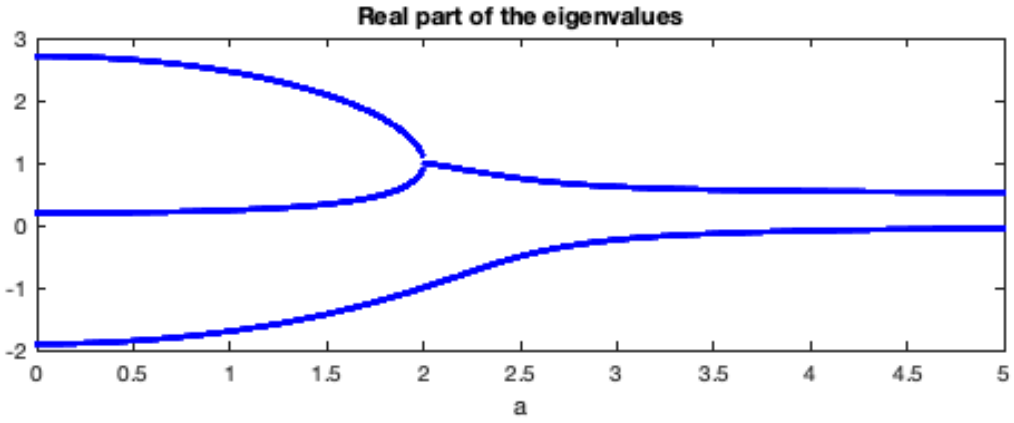
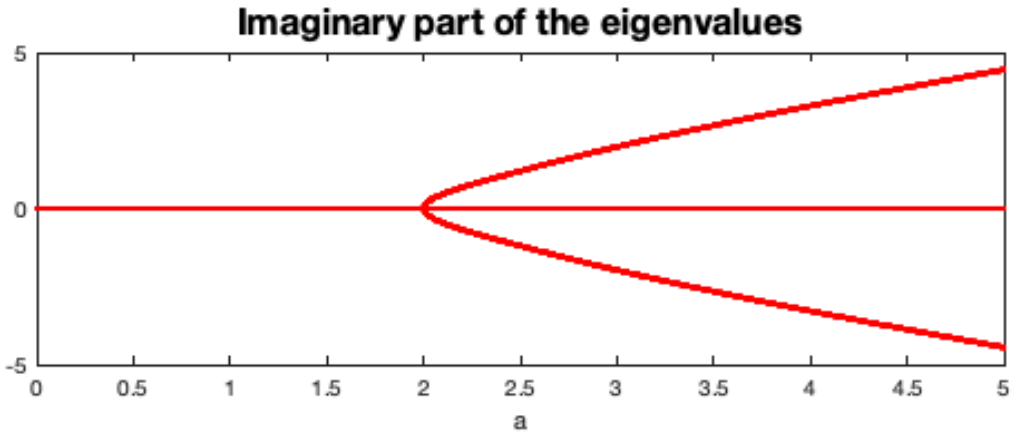
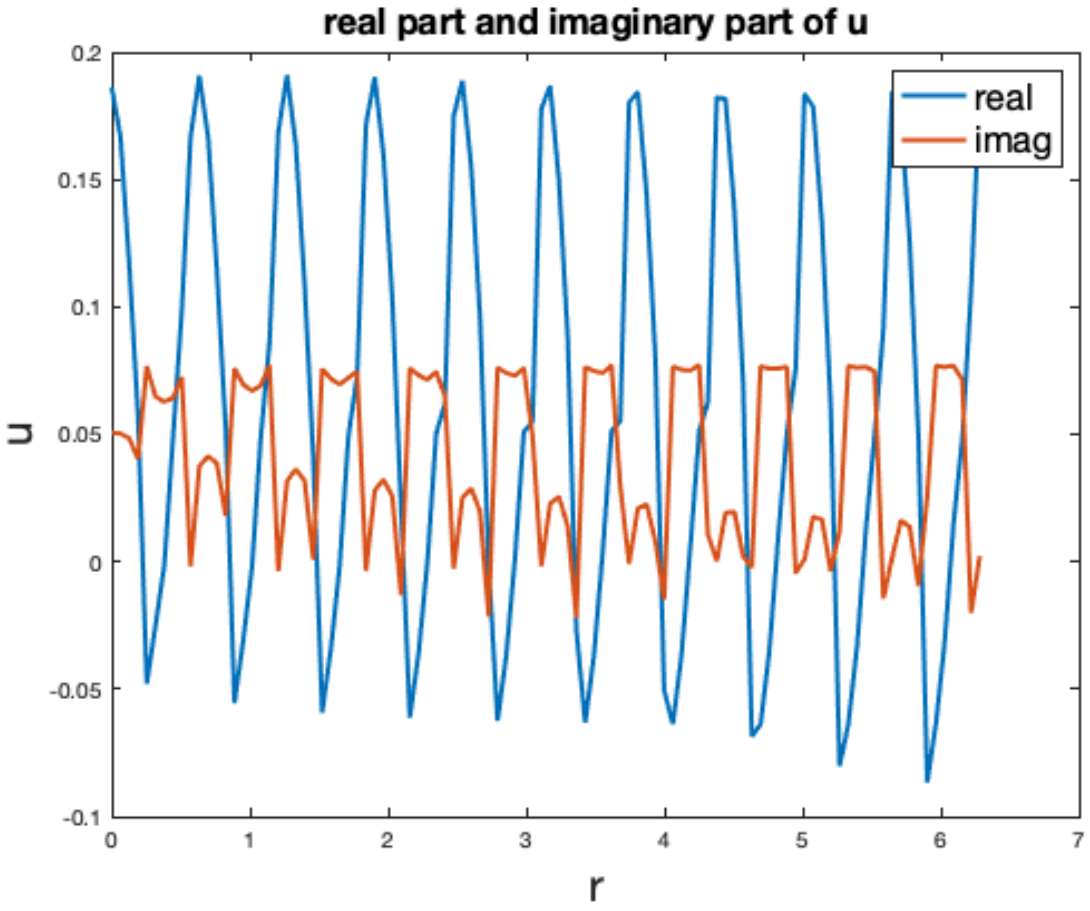
```
% Q1
n=500;
a = linspace(0,5,n);
ss = zeros(6,n);
for j=1:n
   A = kron(eye(2), [0 1 a(j); 1 0 2; -a(j)  2 1]);
   ss(:,j) = eig(A);
end
figure;
subplot(2,1,1)
plot(a, real(ss),'b.','MarkerSize',1)
xlabel('a')
title('Real part of the eigenvalues')
subplot(2,1,2)
plot(a, imag(ss),'r.','MarkerSize',1)
xlabel('a')
title('Imaginary part of the eigenvalues','fontsize',16)


% Q2
kappa = 10;

r = linspace(0,2*pi,100);
u = cos(kappa*r)./kappa - (cos(kappa)+ sin(kappa)*1i)*besselj(0,kappa*r)./
(kappa*(besselj(0,kappa*r) + besselj(1,kappa)*1i));
figure;
p=plot(r,real(u), r, imag(u));
p(1).LineWidth = 2;
p(2).LineWidth = 2;
xlabel('r','fontsize',20);
ylabel('u','fontsize',20);
legend('real', 'imag','fontsize',16);
title('real part and imaginary part of u','fontsize',16);
```


Real part of the eigenvalues
3
2
1
0
-1
-2
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
a


Imaginary part of the eigenvalues
5
0
-5
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
a



Published with MATLAB® R2021b