```
t = solution.phase.time;
EQsol = solution.phase.state;
control = solution.phase.control;

% beta = solution.parameter;
beta = auxdata.beta; A = auxdata.A;
options = odeset('RelTol',1e-10,'AbsTol',1e-10);

m = length(t);
period = t(m);                                    % selected by GPOPS for given nodes

N = 6;
K = auxdata.K;
H = auxdata.rho*auxdata.S/(2*auxdata.m);

CLpp = spline(t,control(:,1));
mupp = spline(t,control(:,2));
xpp = spline(t,EQsol(:,1));
ypp = spline(t,EQsol(:,2));
zpp = spline(t,EQsol(:,3));
vpp = spline(t,EQsol(:,4));
gamapp = spline(t,EQsol(:,5));
psipp = spline(t,EQsol(:,6));

CL = @(t)(ppval(CLpp,t));
mu = @(t)(ppval(mupp,t));
x = @(t)(ppval(xpp,t));
y = @(t)(ppval(ypp,t));
z = @(t)(ppval(zpp,t));
v = @(t)(ppval(vpp,t));
gamma = @(t)(ppval(gamapp,t));
psi = @(t)(ppval(psipp,t));

g = 9.81;
Cd0 = 0.00873;

Pertder = @(t)[0,0,beta.*(A+(2/213).*(1+(-1).*A).*z(t)),cos(gamma(t)).*sin(psi(t)),...
    (-1).*sin(gamma(t)).*sin(psi(t)).*v(t),cos(gamma(t)).*cos(psi(t)).*v(t);

    0,0,0,cos(gamma(t)).*cos(psi(t)),(-1).*cos(psi(t)).*sin(gamma(t)).*v(t),(-1).*...
    cos(gamma(t)).*sin(psi(t)).*v(t);

    0,0,0,sin(gamma(t)),cos(gamma(t)).*v(t),0;

    0,0,(-2/213).*(1+(-1).*A).*beta.*cos(gamma(t)).*sin(psi(t)).*v(t).*...
    sin(gamma(t)), (-2).*H.*(Cd0+CL(t).^2.*K).*v(t) - beta.*sin(gamma(t)).*...
    sin(psi(t)).*cos(gamma(t)).*(A + (1 - A)./213.*2.*z(t)), (-1).*g.*...
    cos(gamma(t)) - beta.*(cos(gamma(t))).^2.*sin(psi(t)).*(A + (1 - A)./213....
    *2.*z(t)).*v(t) + beta.*v(t).*(sin(gamma(t))).^2.*sin(psi(t)).*(A + (1 - A)./213....
    *2.*z(t)), -beta.*v(t).*sin(gamma(t)).*cos(gamma(t)).*
    cos(psi(t)).*(A + (1 - A)./213.*2.*z(t));
    0,0,(2/213).*(1+(-1).*A).*beta.*sin(gamma(t)).*sin(psi(t)).*sin(gamma(t)),...
    CL(t).*H.*cos(mu(t))+g.*cos(gamma(t)).*v(t).^(-2), g.*sin(gamma(t)).*...
    v(t).^(-1) + cos(gamma(t)).*sin(psi(t)).*sin(gamma(t)).*2.*beta.*...
    (A + (1 - A)./213.*2.*z(t)), cos(psi(t)).*sin(gamma(t)).*...
    sin(gamma(t)).*beta.*(A + (1 - A)./213.*2.*z(t));

    0,0,(-2/213).*(1+(-1).*A).*beta.*cos(psi(t)).*tan(gamma(t)), CL(t).*H.*...
    sec(gamma(t)).*sin(mu(t)), CL(t).*H.*sin(mu(t)).*v(t).*tan(gamma(t)).*...
    sec(gamma(t)) + (-1).*beta.*cos(psi(t)).*(A + (1 - A)./213.*2.*z(t))*...
    (sec(gamma(t))).^2 , beta.*tan(gamma(t)).*sin(psi(t)).*(A + (1 - A)./213.*2.*z(t))];



odeLinDS = @(tau,xstate)(Pertder(tau)*(xstate));

initial = eye(N);
FTM = zeros(N);

for i = 1:N
[T,X] = ode45(odeLinDS,0:period/10:period,initial(:,i),options);
FTM(:,i) = X(end,:);
end

[V,D] = eig(FTM);
freq = (1/period).*angle(diag(D))
damp = (1/period).*log(abs(diag(D)))

V1 = V(:,1);
V2 = V(:,2);
V3 = V(:,3);
V4 = V(:,4);
V5 = V(:,5);
V6 = V(:,6);

figure(1);
stem(abs(V1),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);

figure(2);
stem(abs(V2),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);
```

```
figure(3);
stem(abs(V3),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);

figure(4);
stem(abs(V4),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);

figure(5);
stem(abs(V5),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);

figure(6);
stem(abs(V6),'filled');
xl = xlabel('state');
yl = ylabel('absolute value of eigenvector');
set(xl,'FontSize',30);
set(yl,'FontSize',30);
set(gca,'FontSize',25);
```