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gamma=[-45 0 45];
V=[40 60 80];
%alpha0=[];
%alpha4=[];
A= zeros(length(V),3);
B= zeros(length(V),3) ;
C= zeros(length(V),3) ;
for j = gamma(1,1)
    for i = 1:length(V)
        alpha = (1/5)* (((2*1000*9.81*cosd(j))/(1.225*15*V(i)^2))-0.1);
        A(i,1)=V(i);
        A(i,2)=alpha;
        A(i,3)=j;
        %alpha0(end+1)=alpha;
    end
end
for j = gamma(1,2)
    for i = 1:length(V)
        alpha = (1/5)* (((2*1000*9.81*cosd(j))/(1.225*15*V(i)^2))-0.1);
        B(i,1)=V(i);
        B(i,2)=alpha;
        B(i,3)=j;
        %alpha4(end+1)=alpha;
    end
end
for j = gamma(1,3)
    for i = 1:length(V)
        alpha = (1/5)* (((2*1000*9.81*cosd(j))/(1.225*15*V(i)^2))-0.1);
        C(i,1)=V(i);
        C(i,2)=alpha;
        C(i,3)=j;
        %alpha4(end+1)=alpha;
    end
end

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end

D=[A;B];
E=[D;C]
disp(E)

%% Eigen Values Estimation
M_all=cell(size(E,1),1);
for i=1:size(E,1)
    CL= 0.1+(5*E(i,2));
    Dv= -(1/1000)*(1.225*15*E(i,1)*(0.03+(0.05)*CL^2));
    Lv=(1/(1000*E(i,1)))*(1.225*15*E(i,1)*CL);
    Wc=-(9.81)*cosd(E(i,3));
    Ws=((9.81)*sind(E(i,3)))/E(i,1);
    M_all{i}=[Dv Wc
              Lv Ws];
end
eig_all=cell(size(M_all));
for i=1:length(M_all)
    eig_all{i}=eig(M_all{i});
end
for i =1:length(eig_all)
    fprintf('Eigenvalues of M matrix %d:\n', i);
    disp(eig_all{i});
end

%plots
eig_numeric = zeros(size(E,1), 2);
for i = 1:size(E,1)
    ev = eig_all{i};
    eig_numeric(i,:) = ev';
end

gamma_vals = E(:,3);
V_vals = E(:,1);
eig1 = eig_numeric(:,1);

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eig2 = eig_numeric(:,2);

EigenTable = table(V_vals, gamma_vals, eig1, eig2, ...
    'VariableNames', {'Speed_V', 'Gamma_deg', 'Eigenvalue1', 'Eigenvalue2'});
disp(EigenTable);
```