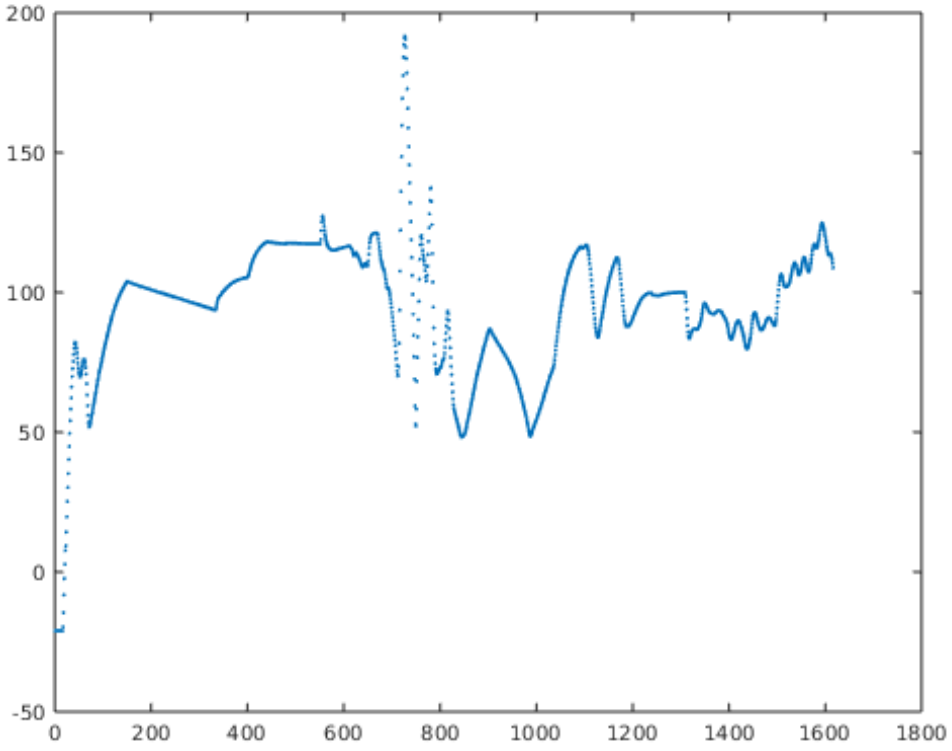
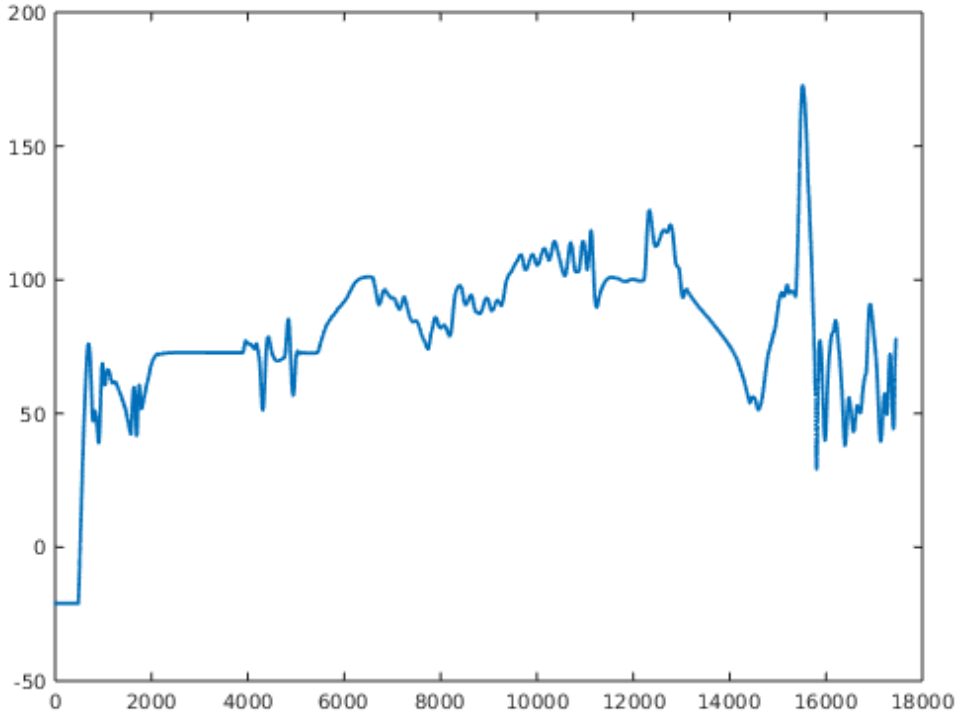
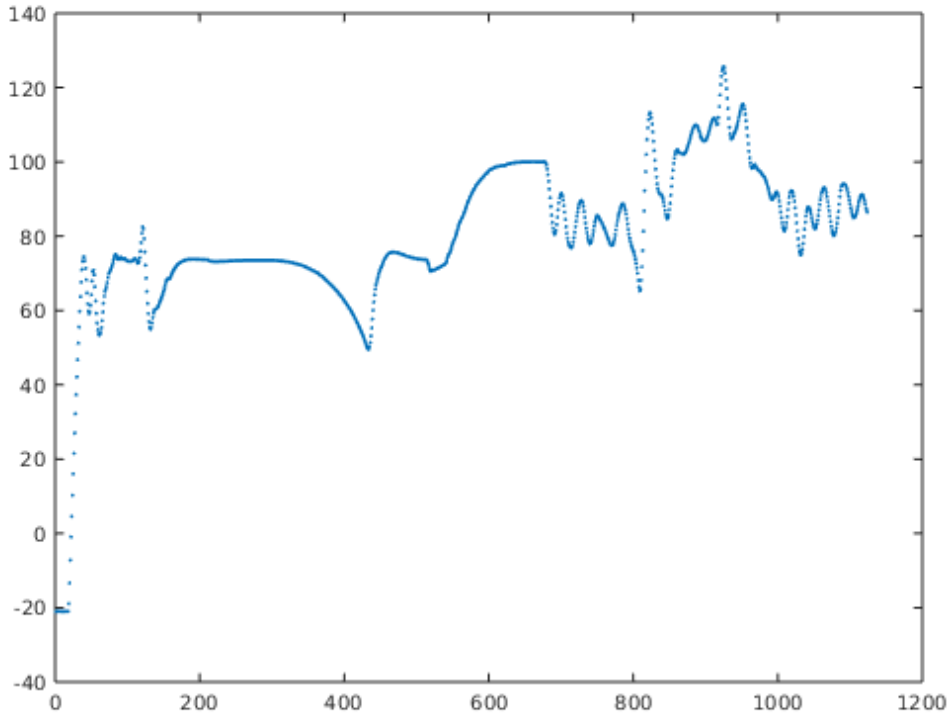
```
clear; close all; clc;
load("Data_ft4.mat")

cg = 4.9;

figure
plot(ft40.Vind_kias,'.')
indexes = [1438, 1482, 201, 1558, 541];

figure
plot(ft4n6.Vind_kias,'.')
indexes_n4 = [8191, 9264, 12096, 887, 12776];

figure
plot(ft42.Vind_kias,'.')
indexes_2 = [1079, 1020, 671, 887, 928];

tables = analysis_1_2(ft40,indexes);
tables_n6 = analysis_1_2(ft4n6,indexes_n4);
tables_2 = analysis_1_2(ft42,indexes_2);

figure
hold on
tas_ea = fit(tables_n6{1}(:,1),tables_n6{1}(:,2), 'poly2');
plot(tas_ea,tables_n6{1}(:,1),tables_n6{1}(:,2),'*-')
xlabel('True Air Speed (knots)')
ylabel('Elevator Angle (degrees)')
title('Datum')
hold off

figure
hold on
cl_ea = fit(tables_n6{2}(:,2),tables_n6{2}(:,3), 'poly1');
plot(cl_ea,tables_n6{2}(:,2),tables_n6{2}(:,3),'*-')
xlabel('CL')
ylabel('Elevator Angle (degrees)')
title('Datum')
hold off
table3(1,:) = [cg,cl_ea.p1,cl_ea.p2];

figure
hold on
tas_ea = fit(tables{1}(:,1),tables{1}(:,2), 'poly2');
plot(tas_ea,tables{1}(:,1),tables{1}(:,2),'*-')
xlabel('True Air Speed (knots)')
ylabel('Elevator Angle (degrees)')
title('Datum minus 6')
hold off

figure
hold on
cl_ea = fit(tables{2}(:,2),tables{2}(:,3), 'poly1');
```

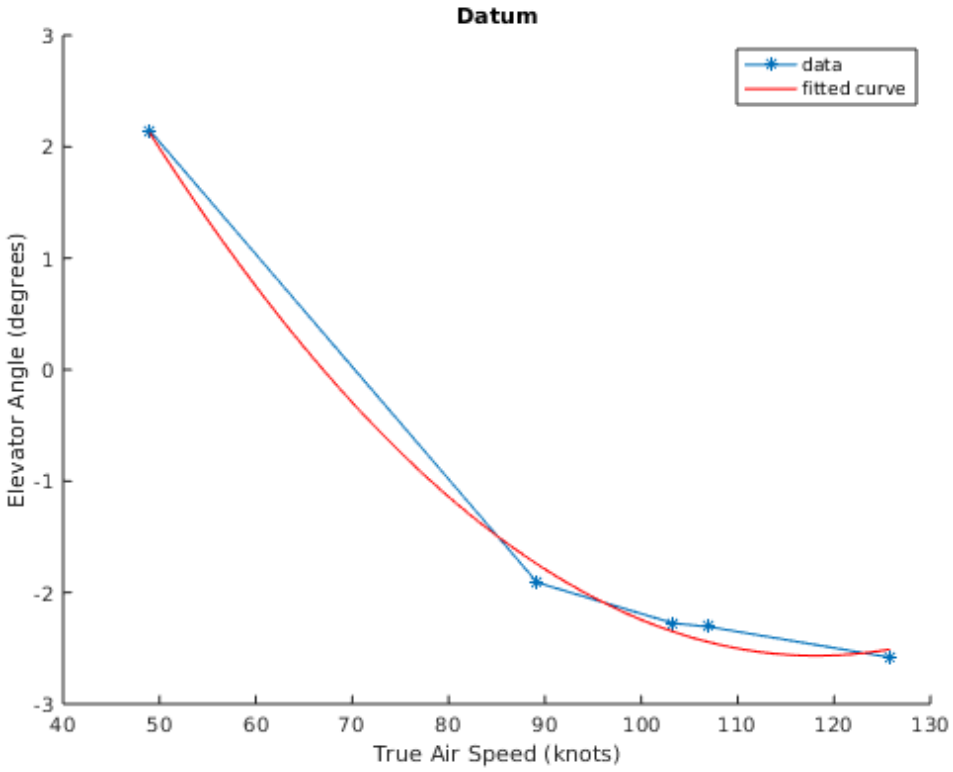
```
plot(cl_ea,tables{2}(:,2),tables{2}(:,3),'*-')
xlabel('CL')
ylabel('Elevator Angle (degrees)')
title('Datum plus 6')
hold off
table3(2,:) = [cg+.5,cl_ea.p1,cl_ea.p2];

figure
hold on
tas_ea = fit(tables_2{1}(:,1),tables_2{1}(:,2), 'poly2');
plot(tas_ea,tables_2{1}(:,1),tables_2{1}(:,2),'*-')
xlabel('True Air Speed (knots)')
ylabel('Elevator Angle (degrees)')
title('Datum minus 2')
hold off

figure
hold on
cl_ea = fit(tables_2{2}(:,2),tables_2{2}(:,3), 'poly1');
plot(cl_ea,tables_2{2}(:,2),tables_2{2}(:,3),'*-')
xlabel('CL')
ylabel('Elevator Angle (degrees)')
title('Datum minus 2')
hold off
table3(3,:) = [cg-(2/12),cl_ea.p1,cl_ea.p2];

figure
hold on
cg_slope = fit(table3(:,1),table3(:,2), 'poly1');
plot(cg_slope,table3(:,1),table3(:,2),'*')
xlabel('cg')
ylabel('d_d_e/d_C_L')
hold off

fprintf("The neutral point is %f \n", cg_slope.p2)
static_margin = cg_slope.p2 + cg_slope.p1*(cg+1);
fprintf("The stick fixed static margin is %f \n", static_margin)
cl_at_100 = mean([tables{2}(3,2),tables_2{2}(3,2),tables_n6{2}(3,2)]);
fprintf("The elevator deflection is %f \n",
 static_margin*cl_at_100+mean(table3(:,3)))


function tables = analysis_1_2(data,ind)
    rho = 20.48;
    for ii = 1:5
        table1(ii,:) = [data.Vtrue_ktas(ind(ii)), -
data.elev1__deg(ind(ii))];
        qbar = .5*rho*(data.Vtrue_ktas(ind(ii))*1.68781)^2;
        table2(ii,:) = [qbar, data.cltotal(ind(ii)), -
data.elev1__deg(ind(ii))];
    end
    tables = {table1, table2};
end
```

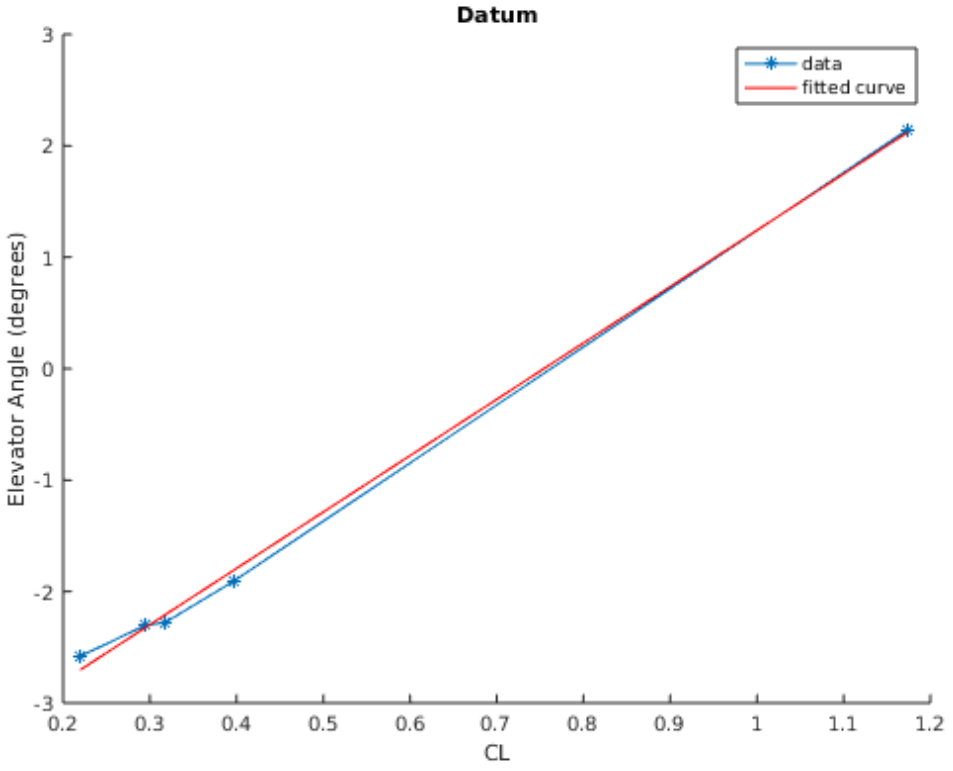
The neutral point is 2.549760
The stick fixed static margin is 7.944244
The elevator deflection is -1.189888

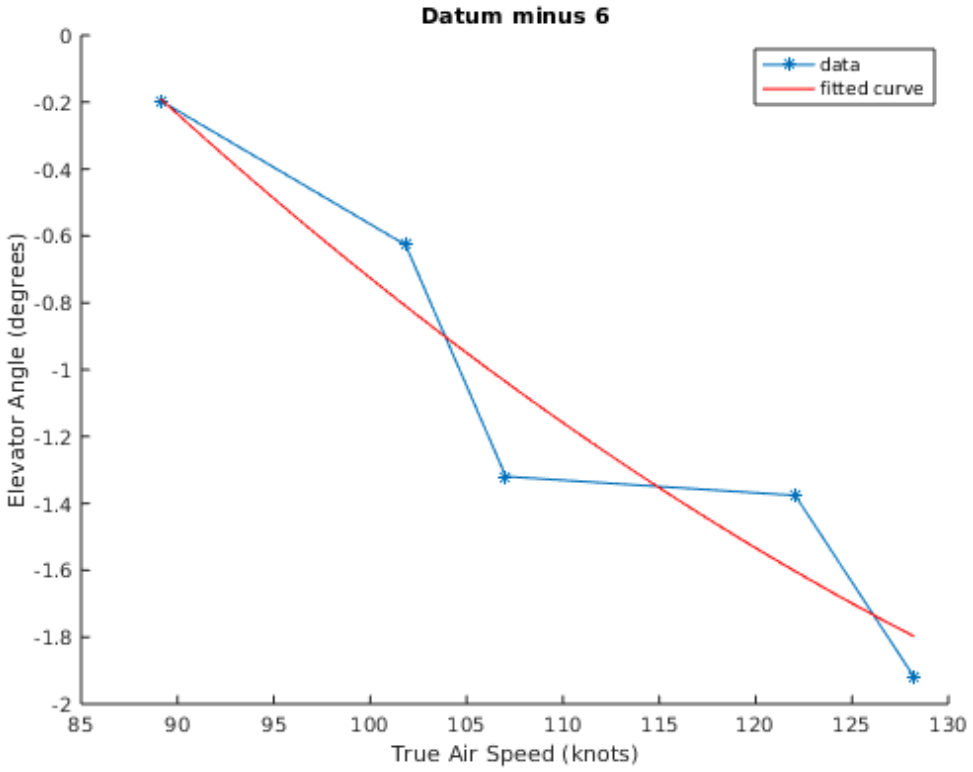


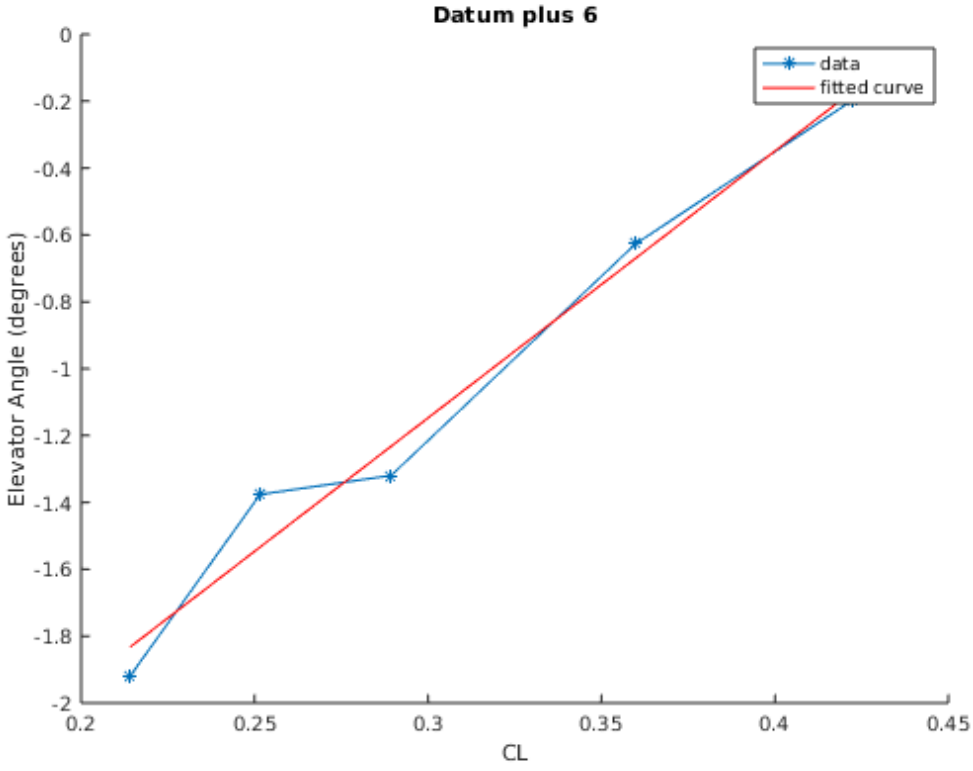

200
150
100
50
0
-50
0
2000
4000
6000
8000
10000
12000
14000
16000
18000

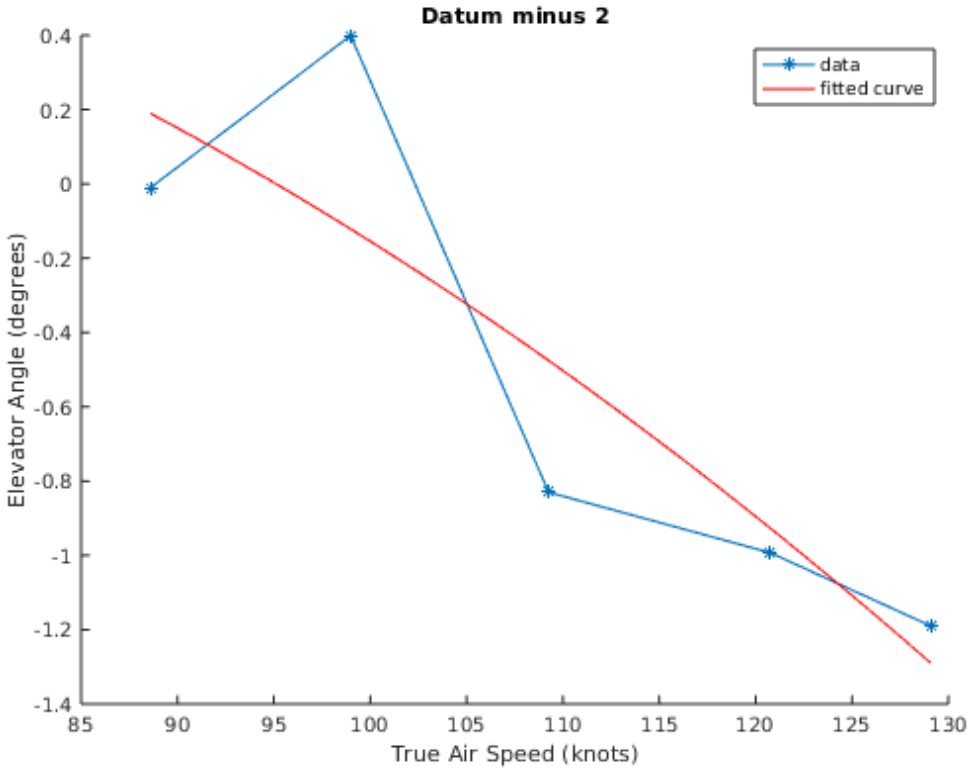

140
120
100
80
60
40
20
0
-20
-40
0
200
400
600
800
1000
1200

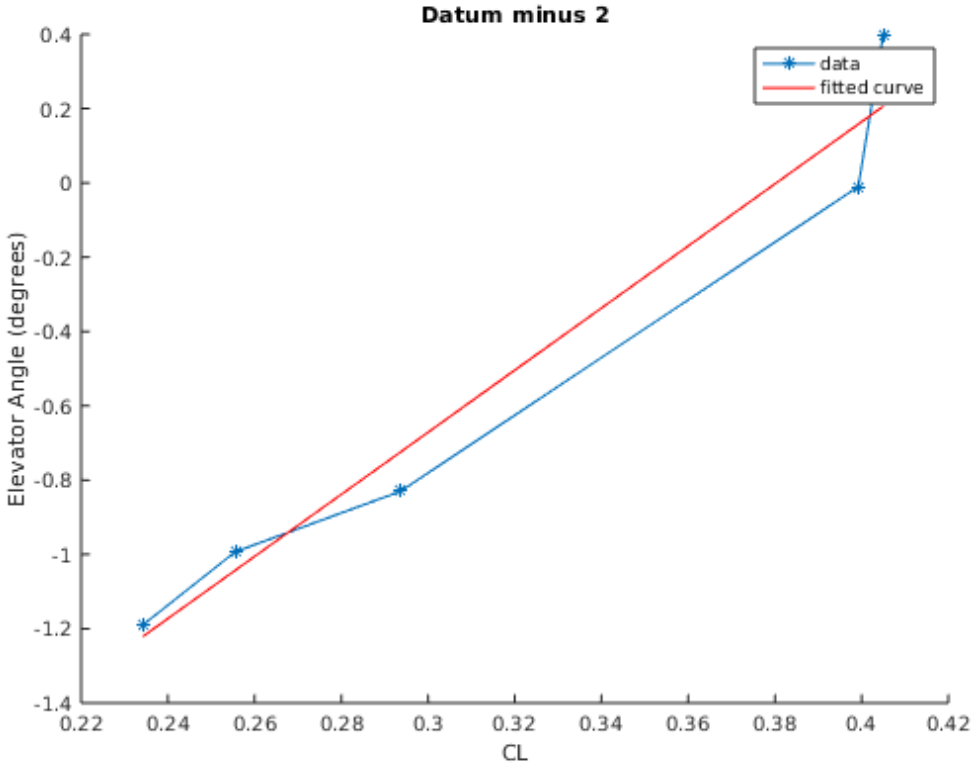

Datum
data
fitted curve
Elevator Angle (degrees)
True Air Speed (knots)
3
2
1
0
-1
-2
-3
40
50
60
70
80
90
100
110
120
130

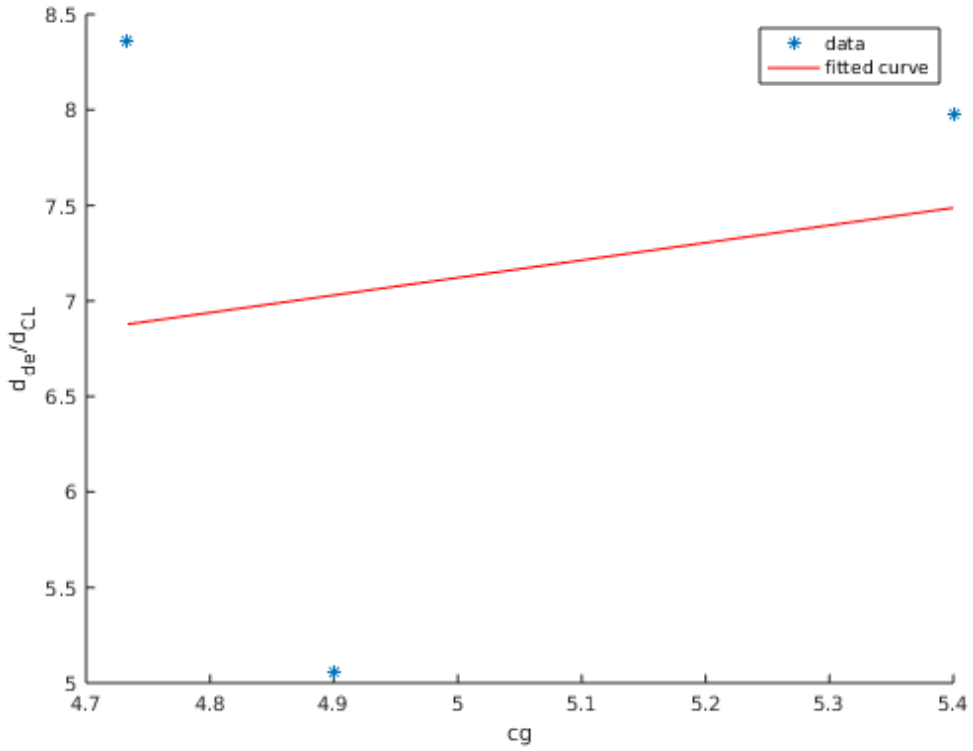

Datum
data
fitted curve
Elevator Angle (degrees)
CL
3
2
1
0
-1
-2
-3
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2


Datum minus 6
data
fitted curve
Elevator Angle (degrees)
True Air Speed (knots)
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
85
90
95
100
105
110
115
120
125
130


Datum plus 6
data
fitted curve
Elevator Angle (degrees)
CL
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
0.2
0.25
0.3
0.35
0.4
0.45


Datum minus 2
data
fitted curve
Elevator Angle (degrees)
True Air Speed (knots)
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
85
90
95
100
105
110
115
120
125
130


Datum minus 2
data
fitted curve
Elevator Angle (degrees)
CL
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42



Published with MATLAB® R2021a