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```
clc; clear;
```

```
q =3.64*10^1 * 1/144 % psi
```

```
Error using evalin
Unrecognized function or variable 'Lab2plots'.
```

x vs y Plot

```
xVals = [0 0.1 0.2 0.4 0.6 0.8 1.2 1.6 2 2.4 3.2 4 4.8 5.6 6.4 7.2 7.6 8 ...
7.6 7.2 6.4 5.6 3.2 2.4 2 1.6 1.2 0.8 0.6 0.4 0.2 0.1];
```

```
yVals = [0, -0.15152, -0.2092, -0.2844, -0.336, -0.37464, -0.4276, ...
-0.45896, -0.47528, -0.48016, -0.46424, -0.42352, -0.36504, -0.29312, ...
-0.20984, -0.11584, -0.06456, 0.008, 0.06456, 0.11584, 0.20984,...
0.29312, 0.46424, 0.48016, 0.47528, 0.45896, 0.4276, 0.37464, 0.336, ...
0.2844, 0.2092, 0.15152];
```

```
plot(xVals, yVals, 'color', 'black', 'linewidth', 1.5);
xlabel('x - Values')
ylabel('y - Values')
title('Airfoil x, y')
hold off
```

Cp vs. X/C at AOA

```
pressureDatapsi = [1.85E-01 -2.43E-01 -2.75E-01 -2.65E-01 -2.48E-01 -1.95E-02 -2.37E-01 -2.11E-01 -1.98E-01
4.94E-02 -1.67E-01 -1.44E-01 7.91E-03 -1.10E-01 -8.58E-02 -5.98E-02 -4.63E-02 -1.57E-02 -6.46E-02 -7.60E-02
-8.59E-02 -9.98E-02 -1.30E-01 -1.35E-01 -1.41E-01 -1.41E-01 -1.44E-01 -1.34E-01 -1.19E-01 -1.01E-01 -6.83E-02
-2.06E-02 ]; pressureDatapsf = pressureDatapsi * 144;
```

```

dynamicPressure = 1.07E+01;

coefficientsPressure = pressureDatapsf / dynamicPressure;

xOverc = [0, 0.0125, 0.025, 0.05, 0.075, 0.1, 0.15, 0.2, 0.25, 0.3,... 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 1.0000, .9500,
0.9000,... 0.8000, 0.7000, 0.4000, 0.3000, 0.2500, 0.2000, 0.1500, 0.1000,... 0.0750, 0.0500, 0.0250, 0.0125];

for i = 1:16 coefficientsPressure(i) = coefficientsPressure(i) * -1; end

coefficientsPressure01 = coefficientsPressure;

for i = 3:29 if abs(coefficientsPressure(i) - coefficientsPressure(i-1)) > 1 coefficientsPressure(i) = (coefficientsPressure(i-1) + coefficientsPressure(i+1))/2; end end coefficientsPressure(1) = 0; coefficientsPressure(32) = 0; coefficientsPressure01(1) = 0; coefficientsPressure01(32) = 0; coefficientsPressure(2) = coefficientsPressure(2) - 1; coefficientsPressure(3) = coefficientsPressure(3) - 1; coefficientsPressure01(2) = coefficientsPressure01(2) - 1; coefficientsPressure01(3) = coefficientsPressure01(3) - 1;

plot(xOverc, coefficientsPressure01, 'color', 'black', 'linewidth', 1) hold on plot(xOverc, coefficientsPressure, 'color', 'red', 'linewidth', 1.5) xlabel('X/c', 'fontsize', 12) ylabel('Coefficients of Pressure (Cp)', 'fontsize', 12) legend('Uninterpolated Data', 'Interpolated Data') grid on hold off

```

AOA -4

```

xOverc = [0, 0.0125, 0.025, 0.05, 0.075, 0.1, 0.15, 0.2, 0.25, 0.3,...
0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 1.0000, .9500, 0.9000,...
0.8000, 0.7000, 0.4000, 0.3000, 0.2500, 0.2000, 0.1500, 0.1000,...
0.0750, 0.0500, 0.0250, 0.0125];

pneg4 = [-9.74E-02    -6.62E-01    -5.72E-01    -4.66E-01    -4.06E-01...
-3.55E-02    -3.37E-01    -2.85E-01    -2.64E-01    4.75E-02
-2.07E-01...
-1.72E-01    4.88E-03    -1.23E-01    -9.47E-02    -6.72E-02
-5.67E-02...
-4.57E-02    -4.95E-02    -5.73E-02    -6.12E-02    -7.12E-02
-7.73E-02...
-7.03E-02    -6.73E-02    -5.65E-02    -4.48E-02    -1.65E-02
8.93E-03...
4.47E-02    1.01E-01    1.56E-01];

pneg4unfixed = pneg4;

for i = 3:29
    if (pneg4(i) - pneg4(i-1)) > 0.1
        pneg4(i) = (pneg4(i-1) + pneg4(i+1))/2;
    end
end

pneg4(1) = -0.8;
pneg4unfixed(1) = -0.8;

lower = pneg4(1:17);
upper = pneg4(17:32);

figure(1)

```

```

plot(xOverc, pneg4unfixed, 'linewidth', 1)
hold on
plot(xOverc, pneg4, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('-4 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = -4
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('-4 Deg. AOA C_p vs. X/c')
grid on
hold off

% Finding Area under Cp curve
% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);
% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_neg4 = (N_u - N_l)/c_bar;

```

AOA 0

```

p0 = [1.85E-01    -2.43E-01    -2.75E-01    -2.65E-01    -2.48E-01...
      -1.95E-02    -2.37E-01    -2.11E-01    -1.98E-01    4.94E-02
      -1.67E-01...
      -1.44E-01    7.91E-03    -1.10E-01    -8.58E-02    -5.98E-02
      -4.63E-02...
      -1.57E-02    -6.46E-02    -7.60E-02    -8.59E-02    -9.98E-02
      -1.30E-01...
      -1.35E-01    -1.41E-01    -1.41E-01    -1.44E-01    -1.34E-01
      -1.19E-01...
      -1.01E-01    -6.83E-02    -2.06E-02];

p0unfixed = p0;

```

```

for i = 3:29
    if (p0(i) - p0(i-1)) > 0.1
        p0(i) = (p0(i-1) + p0(i+1))/2;
    end
end

p0(1) = -0.2;
p0unfixed(1) = -0.2;

lower = p0(1:17);
upper = p0(17:32);

figure(1)
plot(xOverc, p0unfixed, 'linewidth', 1)
hold on
plot(xOverc, p0, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('0 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 0
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('0 Deg. AOA C_p vs. X/c')
grid on
hold off

% Finding Area under Cp curve
% For Cp_lower;
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper;
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4 ; % c/4
C_N_0 = (N_u - N_l)/c_bar;

```

AOA 4

```
p4 = [1.79E-01    4.49E-02   -3.63E-02   -8.49E-02   -1.03E-01...  
      -8.39E-03   -1.39E-01   -1.30E-01   -1.31E-01    5.08E-02  
-1.23E-01...  
      -1.09E-01    1.09E-02   -9.04E-02   -7.35E-02   -5.64E-02  
-4.79E-02...  
      -1.85E-02   -6.20E-02   -7.90E-02   -9.48E-02   -1.23E-01  
-1.72E-01...  
      -1.91E-01   -2.07E-01   -2.18E-01   -2.39E-01   -2.56E-01  
-2.60E-01...  
      -2.76E-01   -2.97E-01   -3.11E-01];  
  
p4unfixed = p4;  
  
for i = 3:29  
    if (p4(i) - p4(i-1)) > 0.05  
        p4(i) = (p4(i-1) + p4(i+1))/2;  
    end  
end  
  
lower = p4(1:17);  
upper = p4(17:32);  
  
figure(1)  
plot(xOverc, p4unfixed, 'linewidth', 1)  
hold on  
plot(xOverc, p4, 'linewidth', 1)  
scatter(xOverc(1:17), lower, 'filled')  
scatter(xOverc(17:32), upper, 'filled')  
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')  
xlabel('X/c (in)')  
ylabel('Pressure (psi)')  
title('4 Deg. AOA Pressure vs. X/c')  
grid on  
hold off  
  
% Cp vs. x/c @ AoA = 4  
q = 3.64*10^1 * 1/144 % psi  
  
Cp_lower = lower/q ;  
Cp_upper = upper/q ;  
  
figure(2)  
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)  
hold on  
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)  
legend('Cp_lower', 'Cp_upper')  
xlabel('X/c (in)')  
ylabel('C_p')  
title('4 Deg. AOA C_p vs. X/c')  
grid on  
hold off
```

```

% Finding Area under Cp curve
% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_4 = (N_u - N_l)/c_bar;

```

AOA 8

```

p8 = [-1.44E-01    1.87E-01    1.29E-01    6.32E-02    2.63E-02...
      -4.10E-05   -3.83E-02   -4.52E-02   -5.61E-02    5.27E-02
      -7.06E-02...
      -6.71E-02    1.33E-02   -6.19E-02   -5.18E-02   -4.32E-02
      -3.90E-02...
      -3.25E-02   -5.84E-02   -7.71E-02   -1.00E-01   -1.31E-01
      -2.13E-01...
      -2.48E-01   -2.75E-01   -3.00E-01   -3.43E-01   -3.80E-01
      -4.23E-01...
      -4.84E-01   -5.77E-01   -7.04E-01];

p8unfixed = p8;

for i = 3:29
    if (p8(i) - p8(i-1)) > 0.05
        p8(i) = (p8(i-1) + p8(i+1))/2;
    end
end

p8(1) = 0.3;
p8unfixed(1) = 0.3;

lower = p8(1:17);
upper = p8(17:32);

figure(1)
plot(xOverc, p8unfixed, 'linewidth', 1)
hold on
plot(xOverc, p8, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('8 Deg. AOA Pressure vs. X/c')
grid on
hold off

figure(2)

```

```

% Cp vs. x/c @ AoA = 8
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('8 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4 ; % c/4
C_N_8 = (N_u - N_l)/c_bar;

```

AOA 10

```

p10 = [-3.82E-01    1.94E-01    1.67E-01    1.08E-01    6.90E-02...
        2.72E-03   -9.81E-04   -1.29E-02   -2.77E-02    5.32E-02
       -5.00E-02...
        -5.11E-02    1.49E-02   -5.33E-02   -4.69E-02   -4.14E-02
       -4.03E-02...
        -3.61E-02   -5.33E-02   -7.07E-02   -9.60E-02   -1.29E-01
       -2.23E-01...
        -2.65E-01   -2.97E-01   -3.29E-01   -3.82E-01   -4.45E-01
       -4.80E-01...
        -5.14E-01   -7.32E-01   -8.89E-01];

p10unfixed = p10;

for i = 3:29
    if (p10(i) - p10(i-1)) > 0.05
        p10(i) = (p10(i-1) + p10(i+1))/2;
    end
end

p10(1) = 0.3;
p10unfixed(1) = 0.3;

lower = p10(1:17);
upper = p10(17:32);

```

```

figure(1)
plot(xOverc, p10unfixed, 'linewidth', 1)
hold on
plot(xOverc, p10, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('10 Deg. AOA Pressure vs. X/c')
grid on
hold off

```

```

% Cp vs. x/c @ AoA = 10
q = 3.64*10^1 * 1/144 % psi

```

```

Cp_lower = lower/q ;
Cp_upper = upper/q ;

```

```

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('10 Deg. AOA C_p vs. X/c')
grid on
hold off

```

```

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

```

```

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

```

```

% Solve for C_N
c_bar = 8/4; %c/4
C_N_10 = (N_u - N_l)/c_bar;

```

AOA 12

```

p12 = [-6.75E-01    1.80E-01    1.86E-01    1.43E-01    1.05E-01...
        5.51E-03    3.12E-02    1.48E-02   -2.75E-03    5.39E-02   -3.20E-02...
        -3.81E-02    1.56E-02   -4.73E-02   -4.47E-02   -4.41E-02
        -4.92E-02...
        -4.68E-02   -5.51E-02   -6.82E-02   -9.29E-02   -1.26E-01
        -2.34E-01...
        -2.83E-01   -3.20E-01   -3.59E-01   -4.22E-01   -5.03E-01
        -5.55E-01...
        -6.27E-01   -9.31E-01, -1.2];

```

```

p12unfixed = p12;

for i = 3:29
    if (p12(i) - p12(i-1)) > 0.03
        p12(i) = (p12(i-1) + p12(i+1))/2;
    end
end

p12(1) = 0.45; p12unfixed(1) = 0.3;
p12(6) = 0.1; p12(2) = 0.3;

lower = p12(1:17);
upper = p12(17:32);

figure(1)
plot(xOverc, p12unfixed, 'linewidth', 1)
hold on
plot(xOverc, p12, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('12 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 12
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('12 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_12 = (N_u - N_l)/c_bar;

```

AOA 13

```
p13 = [-8.24E-01    1.63E-01    1.89E-01    1.54E-01    1.18E-01...
       5.86E-03    4.43E-02    2.69E-02    8.41E-03    5.41E-02    -2.42E-02...
       -3.23E-02    1.68E-02    -4.45E-02    -4.34E-02    -4.66E-02
       -5.47E-02...
       -5.47E-02    -5.99E-02    -6.98E-02    -9.09E-02    -1.22E-01
       -2.36E-01...
       -2.89E-01    -3.27E-01    -3.70E-01    -4.38E-01    -5.26E-01
       -5.85E-01...
       -6.70E-01    -1.05E+00    -1.14E+00];

p13unfixed = p13;

for i = 3:29
    if (p13(i) - p13(i-1)) > 0.03
        p13(i) = (p13(i-1) + p13(i+1))/2;
    end
end

p13(1) = 0.35; p13(2) = 0.25; p13(6) = 0.07;
p13unfixed(1) = 0.35;

lower = p13(1:17);
upper = p13(17:32);

figure(1)
plot(xOverc, p13unfixed, 'linewidth', 1)
hold on
plot(xOverc, p13, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('13 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 13
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('13 Deg. AOA C_p vs. X/c')
```

```

grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_13 = (N_u - N_l)/c_bar;

```

AOA 14

```

p14 = [-9.63E-01    1.42E-01    1.86E-01    1.62E-01    1.29E-01...
       7.08E-03    5.64E-02    3.76E-02    1.85E-02    5.32E-02    -1.69E-02...
       -2.66E-02    1.70E-02    -4.13E-02    -4.32E-02    -4.84E-02
       -6.02E-02...
       -6.34E-02    -6.66E-02    -7.31E-02    -8.79E-02    -1.15E-01
       -2.31E-01...
       -2.86E-01    -3.28E-01    -3.72E-01    -4.44E-01    -5.39E-01
       -6.04E-01...
       -7.04E-01    -1.14E+00    -1.20E+00];

p14unfixed = p14;

for i = 3:29
    if (p14(i) - p14(i-1)) > 0.03
        p14(i) = (p14(i-1) + p14(i+1))/2;
    end
end

p14(1) = 0.45; p14(2) = 0.4; p14(3) = 0.3; p14(6) = 0.08;
p14unfixed(1) = 0.45; p14unfixed(2) = 0.4;

lower = p14(1:17);
upper = p14(17:32);

figure(1)
plot(xOverc, p14unfixed, 'linewidth', 1)
hold on
plot(xOverc, p14, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('14 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 14

```

```

q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend( 'Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('14 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4 %c/4
C_N_14 = (N_u - N_l)/c_bar;

```

AOA 15

```

p15 = [-1.12E+00    1.23E-01    1.87E-01    1.71E-01    1.40E-01...
       7.95E-03    6.75E-02    4.74E-02    2.64E-02    5.37E-02    -1.19E-02...
       -2.35E-02    1.75E-02    -4.24E-02    -4.71E-02    -5.64E-02
       -0.07202387...
       -0.08122587    -0.08298969    -0.08683395    -0.09458447
       -0.1116767    -0.2277575...
       -0.2890444    -0.3330593    -0.3824387    -0.458725    -0.5633645
       -0.6363668...
       -0.7578778    -1.258541    -1.311262];

p15unfixed = p15;

for i = 3:29
    if (p15(i) - p15(i-1)) > 0.03
        p15(i) = (p15(i-1) + p15(i+1))/2;
    end
end

p15(1) = 0.5; p15(2) = 0.43; p15(3) = 0.35; p15(6) = 0.05;
p15unfixed(1) = 0.45; p15unfixed(2) = 0.4; p15(10) = 0;

lower = p15(1:17);
upper = p15(17:32);

figure(1)

```

```

plot(xOverc, p15unfixed, 'linewidth', 1)
hold on
plot(xOverc, p15, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('15 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 15
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('15 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4 %c/4
C_N_15 = (N_u - N_l)/c_bar;

```

AOA 16

```

p16 = [-1.07E+00    1.21E-01    1.84E-01    1.68E-01    1.37E-01...
      8.29E-03    6.59E-02    4.60E-02    2.48E-02    5.41E-02    -1.55E-02...
     -2.82E-02    1.79E-02    -5.28E-02    -6.19E-02    -7.95E-02
    -1.07E-01...
     -1.23E-01    -1.42E-01    -1.53E-01    -1.65E-01    -1.80E-01
    -1.87E-01...
     -2.02E-01    -2.32E-01    -2.80E-01    -3.59E-01    -4.65E-01
    -5.39E-01...
     -6.50E-01    -1.12E+00    -1.15E+00];

p16unfixed = p16;

```

```

for i = 3:29
    if (p16(i) - p16(i-1)) > 0.03
        p16(i) = (p16(i-1) + p16(i+1))/2;
    end
end

p16(1) = 0.5; p16(2) = 0.43; p16(3) = 0.35; p16(6) = 0.05;
p16unfixed(1) = 0.45; p16unfixed(2) = 0.4; p16(10) = 0;

lower = p16(1:17);
upper = p16(17:32);

figure(1)
plot(xOverc, p16unfixed, 'linewidth', 1)
hold on
plot(xOverc, p16, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('16 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 16
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('16 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4 %c/4
C_N_16 = (N_u - N_l)/c_bar;

```

AOA 17

```
p17 = [-1.92E-01    1.86E-01    1.71E-01    1.26E-01    9.33E-02...
       4.46E-03    2.61E-02    1.08E-02   -8.00E-03    5.35E-02   -4.48E-02...
       -5.70E-02    1.84E-02   -8.59E-02   -9.93E-02   -1.22E-01
-1.54E-01...
       -1.99E-01   -2.13E-01   -2.24E-01   -2.29E-01   -2.32E-01
-2.12E-01...
       -2.05E-01   -2.03E-01   -1.99E-01   -1.97E-01   -1.97E-01
-1.92E-01...
       -1.97E-01   -1.95E-01   -1.93E-01];

p17unfixed = p17;

for i = 3:29
    if (p17(i) - p17(i-1)) > 0.03
        p17(i) = (p17(i-1) + p17(i+1))/2;
    end
end

p17(6) = 0.05;
p17(1) = 0.25;
p17unfixed(1) = 0.25;

lower = p17(1:17);
upper = p17(17:32);

figure(1)
plot(xOverc, p17unfixed, 'linewidth', 1)
hold on
plot(xOverc, p17, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('17 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 17
q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend('Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
```

```

title('17 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_17 = (N_u - N_l)/c_bar;

```

AOA 18

```

p18 = [-1.90E-01    1.91E-01    1.74E-01    1.27E-01    9.26E-02...
       3.94E-03    2.26E-02    6.91E-03   -1.32E-02    5.27E-02   -5.20E-02...
       -6.48E-02    1.90E-02   -9.53E-02   -1.09E-01   -1.33E-01
       -0.1647758...
       -0.2109623   -0.2264118   -0.2381296   -0.2443881   -0.2475352...
       -0.2258458   -0.2165322  -0.2131371   -0.2094517   -0.2082829...
       -0.2077451   -0.2034602   -0.2087493   -0.2060661   -0.203908];

p18unfixed = p18;

for i = 3:29
    if (p18(i) - p18(i-1)) > 0.03
        p18(i) = (p18(i-1) + p18(i+1))/2;
    end
end

p18(6) = 0.05;
p18(1) = 0.25;
p18unfixed(1) = 0.25;

lower = p18(1:17);
upper = p18(17:32);

figure(1)
plot(xOverc, p18unfixed, 'linewidth', 1)
hold on
plot(xOverc, p18, 'linewidth', 1)
scatter(xOverc(1:17), lower, 'filled')
scatter(xOverc(17:32), upper, 'filled')
legend('Uninterpolated', 'Interpolated', 'Lower', 'Upper')
xlabel('X/c (in)')
ylabel('Pressure (psi)')
title('18 Deg. AOA Pressure vs. X/c')
grid on
hold off

% Cp vs. x/c @ AoA = 18

```

```

q = 3.64*10^1 * 1/144 % psi

Cp_lower = lower/q ;
Cp_upper = upper/q ;

figure(2)
plot(xOverc(1:17), Cp_lower, 'linewidth', 1)
hold on
plot(xOverc(17:32), Cp_upper, 'linewidth', 1)
legend( 'Cp_lower', 'Cp_upper')
xlabel('X/c (in)')
ylabel('C_p')
title('18 Deg. AOA C_p vs. X/c')
grid on
hold off

% For Cp_lower
N_l = trapz(xOverc(1:17), Cp_lower);

% For Cp_upper
N_u = trapz(xOverc(17:32), Cp_upper);

% Solve for C_N
c_bar = 8/4; %c/4
C_N_18 = (N_u - N_l)/c_bar;

```

C_L plots

```

C_N = [C_N_neg4 C_N_0 C_N_4 C_N_8 C_N_10 C_N_12 C_N_13 C_N_14 C_N_15 C_N_16
C_N_17 C_N_18]

AoA = [ -4 0 4 8 10 12 13 14 15 16 17 18]

%Initialize a 1x12 Matrix for C_l
C_l = zeros(1,12)

for i = 1:12
    C_l(i) = C_N(i)*cosd(AoA(i));
end

figure(1)
hold on
plot(AoA, C_l, 'linewidth', 1)
legend()
xlabel('AoA (deg)')
ylabel('C_l')
title('Coefficient of Lift (C_L) vs. AoA(alpha)')
grid on
hold off

```

Published with MATLAB® R2023b