Aerobatic Wing

Pressure field

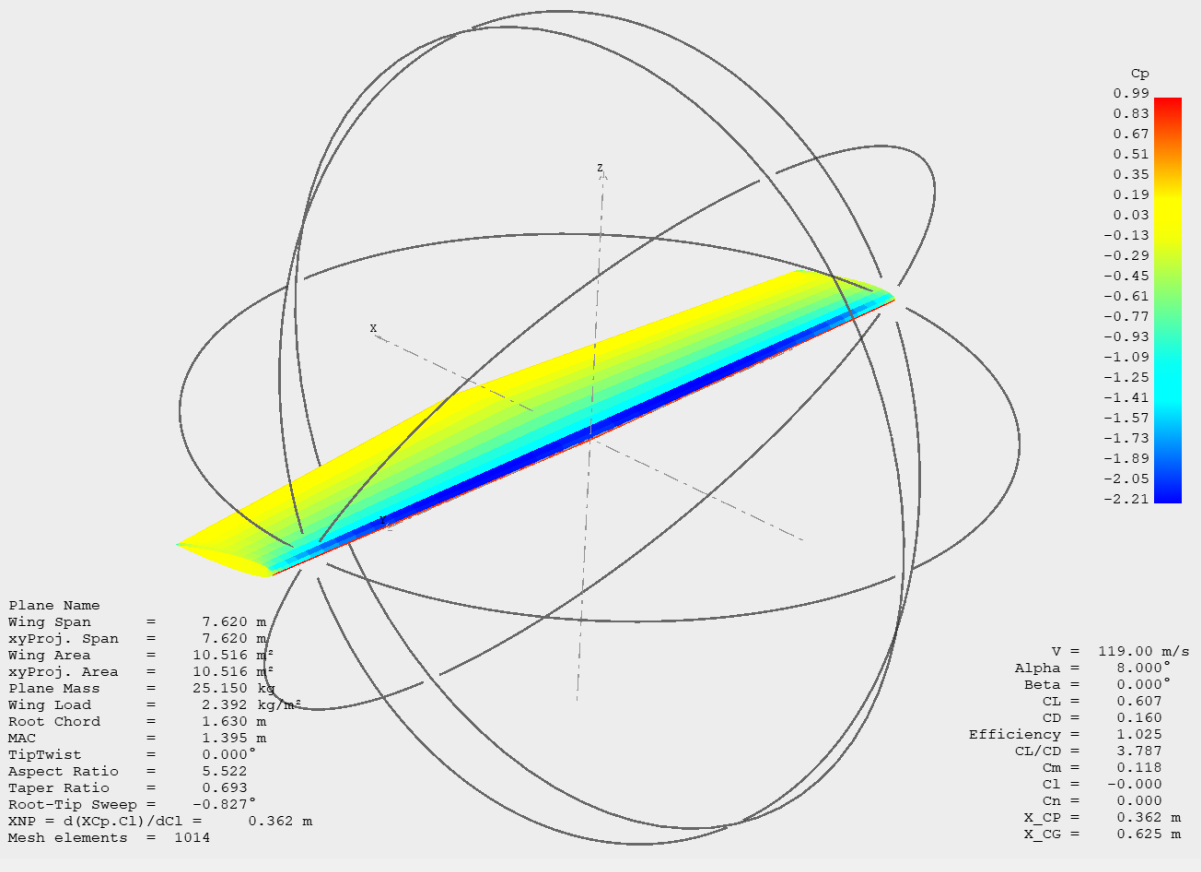
For the purpose of obtainind the appropriate pressure field distribution, the wing was analyzed using Xflr5 where appropriate graphs for Cp(x) and Cl(y) were curve fitted.

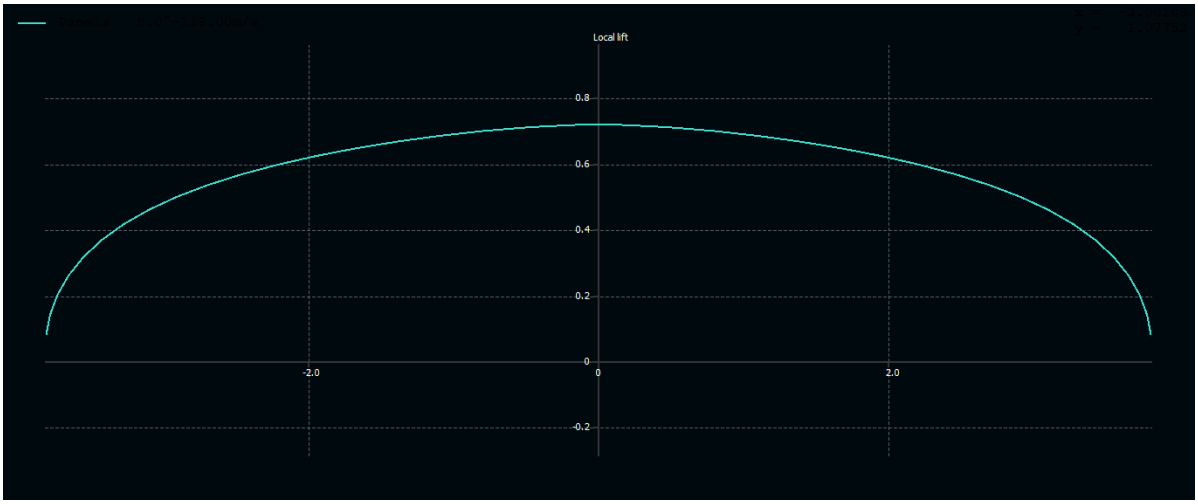
After the equations for Cp(x) and Cl(y) were obtained, they were multiplied and normalized so the pressure field values could be controlled using magnitude of nW in the FEM software.W = ½mg, where m is mass of the airplane and n being the loading factor.

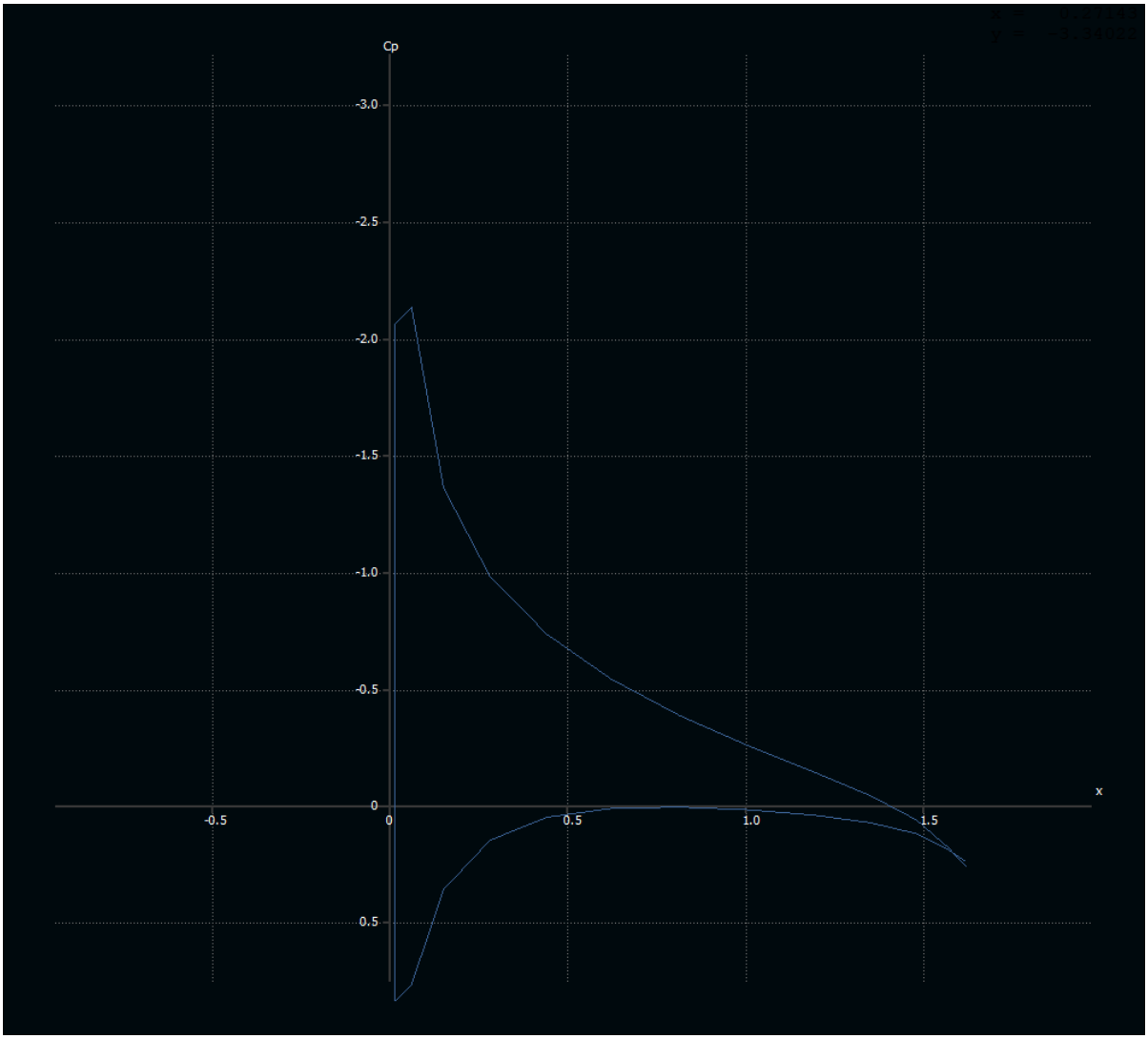
All of these calculations were made using MATLAB.

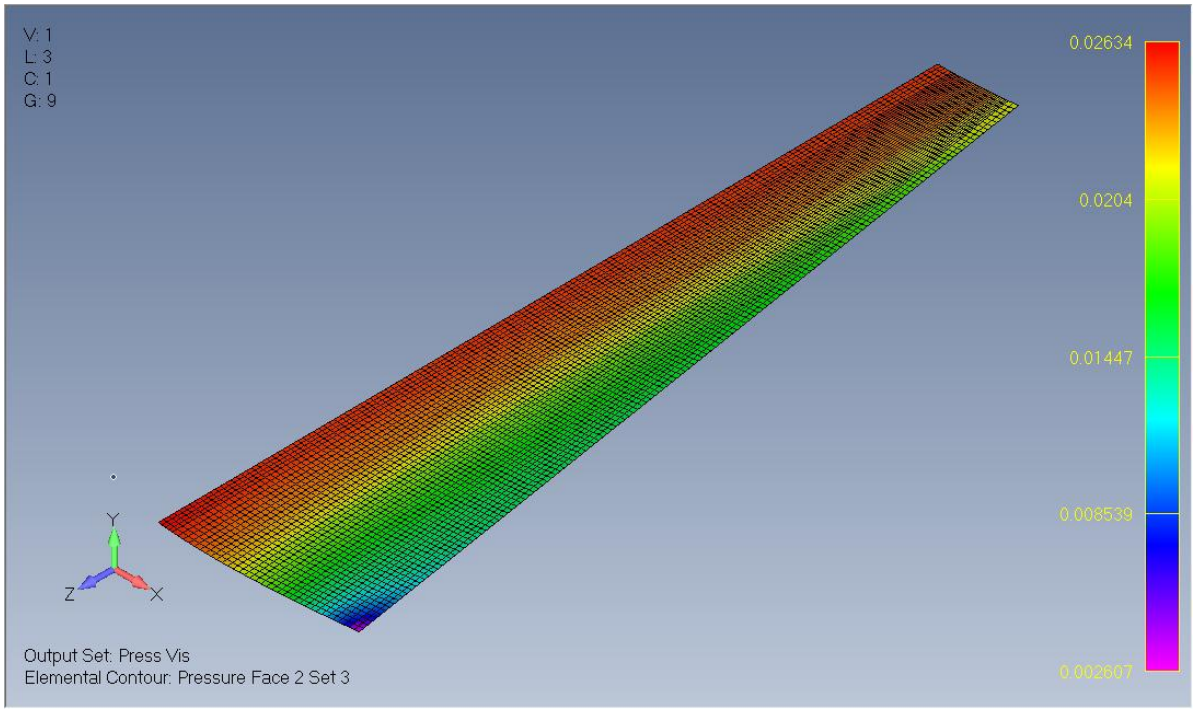
Below are the images that represent, in order: Pressure field on the wing in Xflr5; Lift distribution on the wings (spanwise); Pressure field distribution of the airfoil (root chord - chordwise); Pressure field implemented in FEMAP and multiplied by loading factor of 20G.

The same pressure field will be used for all wing variations and iterations.




Local lift
0.8
0.6
0.4
0.2
0
-0.2
-2.0
0
2.0


Cp
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
0.5
x
-0.5
0
0.5
1.0
1.5


V: 1
L: 3
C: 1
G: 9
0.02634
0.0204
0.01447
0.008539
0.002607
Y
Z
X
Output Set: Press Vis
Elemental Contour: Pressure Face 2 Set 3