

## Aerodynamics – Homework set with Matlab or Scilab

1. Plot figures that show equipotential and streamlines for each of the following 2-D elementary potential flows:

- a) Uniform flow at an angle of 2 degrees with the x axis.
- b) Corner flow with angle of 90 degrees at the corner.
- c) Source at the origin.
- d) Vortex at the origin.
- e) Doublet at the origin.
- f) Rankine oval with a source at  $z=0$  and a sink at  $z=1+0i$

2. 2-D Cylinder with Magnus effect. Plot streamlines, equipotential and isobaric curve for a circle of unit radius at the origin, then add a clockwise circulation and a uniform flow, which is aligned with the real (x) axis.

3. Apply the Joukowski transformation to the previous cylinder, so as to generate the corresponding airfoil. Then plot streamlines, equipotential and isobaric curves. The latter should be scaled in terms of the pressure coefficient,  $c_p$ .