

STUDY GUIDE #5 –IDEAL FLOWS

1. In the use of the streamfunction and velocity potential to describe 2D flows what conditions are required?
2. Do you understand and can you describe the physical flows and the corresponding streamfunctions and velocity potentials for the basic flows of: uniform flow, source/sink flows, and vortex flows?
3. Can you write equations for the basic flows when the origin of the flow is shifted away from the origin of the flow field?
4. A doublet is a combination of what basic flows, can you describe how they are combined? Sketch streamlines and velocity potential lines for a doublet.
5. A doublet has a “sign” associated with it – can you describe the changes of the flow associated with a positive and negative sign for a doublet?
6. What are the conditions for a stagnation point? Can you give an example?
7. Adding circulation to the simulated flow over a cylinder does what to the characteristics of the streamlines? How does this addition change the lift and drag forces?
8. As the circulation is increased what happens to the stagnation points on a cylinder in crossflow? How does one mathematically and physically increase circulation for this type of flow?
9. Can you determine the pressure at a point on a cylinder surface in crossflow and then use this to determine the forces acting on the cylinder? Similarly can you determine the surface velocity?
10. What is d’Alembert’s paradox and why did it exist?