Review for Final Exam: Fluid Dynamics I, December 2005


2. Derivation of equations of motion (mass, momentum, + pressure-density relation) for an inviscid, barotropic fluid. Definition of an incompressible fluid, and equations for it. Boundary conditions for an inviscid fluid at a rigid boundary.


5. 2D Flows with vorticity: The 2D point vortex. Steady flow of an inviscid fluid of constant density- vorticity is constant on streamlines.


7. Lift in steady 2D potential flow. The Kutta condition and the lift on a flat plate (use of conformal map). The Blasius theorems.

8. Prandtl’s lifting line theory. Induced drag.

9. Definition of apparent mass in unsteady potential flow.


11. Stokes’ equations as an approximation for low Reynolds number.

12. The boundary layer as an approximation for high Reynolds number. Derivation of Prandtl’s boundary-layer equations. The Blasius solution for the boundary layer on a flat plate. (Use of similitude.) The boundary layer as a singular perturbation.