

Topics

1. Overview, Equations, Ideal Fluids

- Overview of phenomenology, especially turbulence
- potential flow
- quasi-momentum, induced mass

2. Vorticity and Viscous Flow

- Kelvin's Theorem, Induction Equation, Freezing-in Law
- Viscous Flow, Stokesian Dynamics and Drag, Clamshell Theorem

3. Instabilities

- interfacial: Rayleigh-Taylor, Kelvin-Helmholtz
- Generalized Interchanges: Rayleigh-Benard and extensions.

4. Boundary Layers

- Blasius Boundary Layer
- Basics of Drag and Lift
- Drag Crisis

5. Turbulence I- Microscopics

- Basic ideas, K41 Model in depth
- Richardson Phenomenology, Anomalous Exponents

6. Turbulence II- Macroscopics

- Pipe Flow Turbulence, Prandtl Law of Wall
- Turbulent Wakes, Wake Structure
- Spreading and Entrainment-Loitsyansky Problem

7. Module I (4 lectures)-TBA

8. Module II (4 lectures) -TBA