

TOPICS: AE 514 — BOUNDARY LAYER THEORY

- **Boundary layers**
- **Exact flow solutions displaying boundary-layer behavior**
 - Stokes first and second problems
 - Stagnation flow
 - Jeffery-Hammel flow
 - A point-momentum-source jet
- **The boundary layer limit – by inspection**
 - Vorticity transport perspective
 - The Prandtl boundary layer equations
- **The BL limit as an asymptotic limit**
 - Regular limits
 - Singular limits
 - Matched asymptotic expansions
 - ...
- **Second-order boundary layer equations**
- **Solutions of the BL equations**
 - Blasius
 - Falkner-Skan
 - ...
- **BL flow phenomena**
 - Separation
 - phenomenology
 - triple-deck theory
 - Compressibility effects
 - Thermal boundary layers
 - What we see at the bottom of a stirred cup (3D boundary layers)
 - BL-shock coupling in hypersonics
 - Streaming
 - ...
- **Integral formulations**
- **BL stability**
 - Tollmien-Schlichting theory and corroborating experiments
 - Effects of T
 - Compressibility
 - Transient algebraic growth
 - ...
- **Turbulence and turbulent BL's**
 - The nature of turbulent boundary layers

- The log law
 - ...
- Acoustic boundary layers
- TBD ...