

EML 6715 - FLUID DYNAMICS II
Common Course Syllabus

Catalog Description: 3 CREDITS. Prerequisite: EML 6125 Fluid Dynamics I. Continue the discussion of inviscid and viscous flow. Similar and non-similar solutions of the boundary layer equation, compressible boundary layers, Von Mises transformation, Stewartson's transformation, Crocco integral, hydrodynamic instability and transition, elementary turbulent flows, turbulence modelings, hypersonic interaction, slip flows.

Goals: This course is designed to illustrate the behavior of flow of the real viscous fluid. The students will be able to understand the phenomenon of the effect of viscosity, and the roll played in the inviscid flow treatment, based upon the concept of Boundary Layer. Both laminar and turbulent flows will be examined.

Topics:

1. The basic equations of motion for the flow of a viscous fluid
2. Exact solutions of the Navier-Stokes equation and fully developed flows
3. Boundary layer concept and its implications and ramifications
4. Numerical solutions of the Falkner-Skan boundary layer equation
5. Jets and wakes
6. Viscid-Inviscid flow interaction
7. Instability of the laminar flow
8. Turbulent flows, turbulent boundary layers, including the history of turbulence modeling
9. Compressible flows—Stewartson transformation—Culick-Hill Transformation

Course Outcomes:

1. The students will be able to understand the importance of effects of viscosity.
2. The students will be able to understand the importance of the inviscid flow treatment of many engineering problems in this area.

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