AE805 EXPERIMENTAL METHODS IN THERMAL FLUIDS 2-0-1-3

Review of Fluid Flow Physics – Flow measurements: What do we measure, and why? – Uncertainty – Systematic and Random Errors – Error Analysis - Uncertainty Propagation

Pressure, Temperature and Velocity measurement: Steady and Unsteady Flow Field – Design of Aerodynamic Probe for Static, Total and Flow Angularity Measurements – Calibration of Five hole, Seven hole and Omni Probes – Pressure gauge and transducers – Pressure Sensors: Principle of Operation and Calibration. Temperature Measurement – Selection of Thermocouple and Measurement using Lab VIEW.

Introduction to Hot-wire Anemometer – Calibration – Two different modes of Electronic Circuitry: Constant Temperature and Constant Current – Calibration and Data Extraction Procedures – Application to Practical Problems

Flow Visualization shadowgraph and Schlieren Photography; Laser Doppler Velocimetry; particle image velocimetry (PIV); advanced PIV techniques (Stereo PIV, 3-D PIV, Holograph PIV, Microscopic PIV); Incandescent laser induced fluorescence; pressure sensitive painting, temperature sensitive painting

TEXT BOOKS/REFERENCES:

1. E. Ower R. C. Pankhurst, “The Measurement of Air Flow”, 5th Edition, Pergamon Press, 1977.
2. Ethirajan Rathakrishnan, “Instrumentation, Measurements, and Experiments in Fluids”, 1st Edition, CRC Press, 2016.
3. Norman Chigier (Ed.), “Combustion Measurements”, CRC Press, 1991.