

Final Year Undergraduate Course in Aeroacoustic Measurements

Text Book: The Aeroacoustics of Low Mach Number Flows, *Fundamentals, Analysis and Measurements* by Stewart Glegg and William Devenport, 1st Edition

Turbulence and Sound

- 1.1 Aeroacoustics of Low Mach Number Flows
- 1.2 Sound Waves and Turbulence
- 1.3 Quantifying Sound Levels and Annoyance

Linear Acoustics

- 3.1 The Acoustic Wave Equation
- 3.2 Plane waves and Spherical waves
- 3.3 Harmonic Time Dependence
- 3.4 Sound Generation by a Small Sphere
- 3.5 Sound Scattering by a Small Sphere
- 3.6 Superposition and Far Field Approximations
- 3.8 Acoustic Intensity and Sound Power Output

Lighthill's Acoustic Analogy

- 4.1 Lighthill's Analogy
- 4.3 Curle's theorem
- 4.4 Monopole, Dipole and Quadrupole Sources

Turbulence and Stochastic Processes

- 8.1 The Nature of Turbulence
- 8.2 Averaging and the Expected Value
- 8.3 Averaging of the Governing Equations and Computational Approaches
- 8.4 Description of Turbulence for Aeroacoustic Analysis

Aeroacoustic Testing and Instrumentation

- 10.1 Aeroacoustic Wind Tunnels
- 10.2 Wind Tunnel Acoustic Corrections
- 10.3 Sound Measurement
- 10.4 The Measurement of Turbulent Pressure Fluctuations
- 10.5 Velocity Measurement

Measurement, Signal Processing and Uncertainty

- 11.1 Limitations of Measured Data
- 11.2 Uncertainty
- 11.3 Averaging and Convergence
- 11.4 Numerically Estimating Fourier Transforms
- 11.5 Measurement as seen from the Frequency Domain
- 11.6 Calculating Time Spectra and Correlations
- 11.7 Wavenumber Spectra and Spatial Correlations

Phased Arrays

- 12.1 Basic Delay and Sum Processing
- 12.2 General approach to array processing
- 12.3 Deconvolution Methods
- 12.4 Correlated Sources and Directionality
- 12.5 Methods Based on Source Models