

Turbulence, Sound and Aeroacoustics for Naval Applications

William Devenport

Virginia Tech (U.S.A.)

Sound and hydroacoustic applications provide both motivation and creative avenues for the understanding of turbulent flows. Modern technology provides ever greater capabilities for their experimental study, from novel facility arrangements, to optical diagnostics to microphone array systems. Recent experimental work conducted at Virginia Tech will be described, including studies of turbulence ingestion by an idealized rotor system, and rough wall boundary layers at very high Reynolds numbers. Both studies use state-of-the-art experimental capabilities at the Virginia Tech Stability Wind Tunnel. The rotor studies have revealed new insight into the instantaneous flow structure generated by rotors and the mechanisms through which they produce sound. Measurements of the boundary layer pressure fluctuations have revealed new scalings both at high and low frequency.