Core noise measurements on a small, general aviation class turbofan engine

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wind tunnel. The test conducted covered pressure ratios from 1.4 to 2.5 at total temperatures of 810°K and ambient. Data were obtained using four different acoustic arena arrangements. Data taken with the different arrangements are compared. The results obtained are also compared with data from other facilities and with a prediction procedure developed elsewhere [i.e., Stone and Montegani (1979).]

3:15

BBB6. Core noise measurements on a small, general aviation class turbofan engine. Meyer Reshotko and Allen Karchmer (NASA-Lewis Research Center, Cleveland, OH 44135)

As part of a program to investigate core and combustor noise, simultaneous measurements were made of internal fluctuating pressure and farfield noise on a JT-15D turbofan engine. Acoustic waveguide probes, located in the engine at the combustor, in the turbine exit and in the core nozzle, were used to measure internal fluctuating pressures. Low-frequency acoustic power determined at the core nozzle exit corresponds in level to the farfield acoustic power at engine speeds below 70% of maximum, the approach condition. At engine speeds above 70% of maximum, the jet noise dominates in the farfield, greatly exceeding that of the core. From coherence measurements, it is shown that the combustor is the dominant source of the low-frequency core noise. The results obtained from the JT-15D engine compare favorably with those obtained previously from a YF-102 engine, both engines having reverse flow annular combustors and being in the same size class.

3:30

BBB7. Aeroacoustic measurements on a lifting wing/flap at Reynolds numbers to 2.8 × 10^6. James M. Kendall (Jet Propulsion Laboratory, Pasadena, CA 91103)

Progress in the control of airframe (nonpropulsive) noise rests upon identification of the several sources disposed about an aircraft. Acoustic measurements were made in the NASA Ames 7 × 10-ft wind tunnel on a 0.75-m chord wing/flap combination at speeds to 57 m/s. The flap was divided at mid-span, and the halves were set 0°–0°, 0°–35°, and 35°–35° with respect to the wing. A directional microphone system was placed outside the tunnel but in communication with the model through an opening. The microphone axis was scanned in a two-dimensional array of aiming points about the lower side of the wing to determine the locations of sources which radiate downward from an aircraft. The results show that the sites of noise production, and the spectra and intensity of these, differ considerably among the test configurations. Speculation is made on the fluid dynamic processes of generation.

3:45

BBB8. Features of the wall pressure field associated with turbulent spots in a laminar boundary layer. Fred C. DeMetz (Bendix Electrodynamics Division, Sylmar, CA 91342)

Measured features of the mean and fluctuating components of the wall pressure field associated with individual turbulent spots in a laminar boundary layer passing a fixed observation station are compared with those calculated from structural models proposed in the literature. The temporal variation of the nonsteady mean pressure field during spot passage over a fixed, flush-mounted, point pressure transducer tends to support the model of a turbulent spot in a laminar boundary layer as a large horseshoe vortex. The spectral features of the fluctuating spot wall pressure field remain constant in amplitude and distribution during spot growth and convection downstream.

4:00

BBB9. Harmful jet noise at schools and residences near Los Angeles International Airport *seven years later*. Sam R. Lane (2044 Swan Drive, Costa Mesa, CA 92626)

A study of excessive noise at schools due to commercial jet aircraft approaching Los Angeles International Airport was reported at the November 1973 ASA meeting in Los Angeles. The results indicated that school children were exposed to maximum aircraft noise levels often greater than 115 dBA, which exceeds established limits for serious adverse effects on health and hearing. Subsequent to 1973, the EPA (region IX) conducted 24-h noise monitoring on several days for two successive years at Felton School, where the highest noise levels occur. More recent measurements (1980) have also been obtained. Important questions that arise include: (1) Have the jet aircraft noise levels changed since 1973? and (2) Are the school children and area residents still exposed to harmful noise levels? This paper presents a summary of the ensuing studies and a comparison of the results. [Work not supported by any government agency.]

FRIDAY AFTERNOON, 21 NOVEMBER 1980 LOS ANGELES ROOM, 1:00 TO 4:15 P.M.

Session CCC. Physical Acoustics IX: General

Mark C. Lee, Chairman

Jet Propulsion Laboratory, Mail Stop 169-327, Pasadena, California 91103

Contributed Papers

1:00

CCC1. The linear dynamic range of a simple optical nearfield diffraction technique for studying ultrasonic waves. Ward A. Riley, Jr. (Bowman Gray School of Medicine of Wake Forest University, Winston-Salem, NC 27103)

An optical nearfield diffraction technique was recently described for studying ultrasonic waveforms in the low megahertz frequency range [W. A. Riley, J. Acoust. Soc. Am. 67, 1386–1388 (1980)]. The theoretical optical amplitude response of this technique is linear with acoustical pressure under only a limited range of experimental conditions. Higher harmonics of the fundamental ultrasonic frequency are also generated in the optical signal above this range. Application of this method to the calibration of transducers used in a variety of medical and industrial applications requires that careful consideration be given to the linear dynamic range of this approach. The objective of this work was to experimentally determine the