NASA TECH BRIEF

NASA Pasadena Office

Acoustic Spectral Analysis and Testing Techniques

Four reports have been published (see references) that outline some recent developments in acoustic spectral analysis. The subjects covered are described below.

The *Octave and One-Third Octave Acoustic Noise Spectrum Analysis* discusses mathematical techniques for combining decibel levels of octaves or constant bandwidths with an overall spectrum level; determining the octave levels in a second octave system when the levels in the first octave are known; and determining the one-third octave levels when the octave levels and the decibels-per-octave slope are known.

In *Power Spectral Density Analysis,* generalized techniques are developed for determining the equation for a power spectral density function. Moreover, an equation is developed that determines the root mean square of a power spectral density function.

The report on *A Digital Technique For Determining 1/3 – Octave Sound-Pressure Levels With a More Uniform Confidence Level* describes a computer program that analyzes acoustical test data. The program uses a fast Fourier subroutine to calculate the discrete Fourier coefficients that transform the time-domain data to frequency-domain data. Multiple Fourier transforms are used to convert the narrow-band frequency data to 1/3-octave data.

In the *Acoustic Spectrum Shaping Utilizing Finite Hyperbolic Horn Theory,* sound spectra of high-intensity sound are shaped for single horns and multiple-horn arrays. This technique utilizes computer simulation of horn responses by use of the hyperbolic horn theory.

References:

C. D. Hayes and M. D. Lamers, Technical Report 32-1052, Octave and One-Third Octave Acoustic Noise Spectrum Analysis.

C. D. Hayes, Technical Report 32-928, Revision 1, Power Spectral Density Analysis.

J. W. Shipley and R. A. Slusser, Technical Memorandum 33-422, A Digital Technique for Determining 1/3-Octave Sound-Pressure Levels With a More Uniform Confidence Level.

C. D. Hayes, Technical Report 32-1141, Acoustic Spectrum Shaping Utilizing Finite Hyperbolic Horn Theory.

Note:

Requests for this documentation and other information may be addressed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91102
Reference: B72-10341

Patent status:

No patent action is contemplated by NASA.

Source: C. D. Hayes, M. D. Lamers,
J. W. Shipley, and
R. A. Slusser of
Jet Propulsion Laboratory of
California Institute of Technology
under contract to
NASA Pasadena Office
(NPO-11554)

Category 03