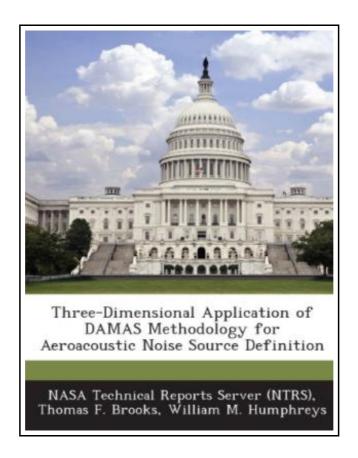
Three-Dimensional Application of Damas Methodology for Aeroacoustic Noise Source Definition



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(Guy Ruecker)

THREE-DIMENSIONAL APPLICATION OF DAMAS METHODOLOGY FOR AEROACOUSTIC NOISE SOURCE DEFINITION



BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 26 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.At the 2004 AIAACEAS Aeroacoustic Conference, a breakthrough in acoustic microphone array technology was reported by the authors. A Deconvolution Approach for the Mapping of Acoustic Sources (DAMAS) was developed which decouples the array design and processing influence from the noise being measured, using a simple and robust algorithm. For several prior airframe noise studies, it was shown to permit an unambiguous and accurate determination of acoustic source position and strength. As a follow-on effort, this paper examines the technique for three-dimensional (3D) applications. First, the beamforming ability for arrays, of different size and design, to focus longitudinally and laterally is examined for a range of source positions and frequency. Advantage is found for larger array designs with higher density microphone distributions towards the center. After defining a 3D grid generalized with respect to the array s beamforming characteristics, DAMAS is employed in simulated and experimental noise test cases. It is found that spatial resolution is much less sharp in the longitudinal direction in front of the array compared to side-to-side lateral resolution. 3D DAMAS becomes useful for sufficiently large arrays at sufficiently high frequency. But, such can be a challenge to computational capabilities, with regard to the required expanse and number of grid points. Also, larger arrays can strain basic physical modeling assumptions that DAMAS and all traditional array methodologies use. An important experimental result is that turbulent shear layers can negatively impact attainable beamforming resolution. Still, the usefulness of 3D DAMAS is demonstrated by the measurement of landing gear noise source distributions in a difficult hard-wall wind tunnel environment. This item ships from La Vergne, TN. Paperback.

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