Speed of sound in pure water as a function of temperature

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wave-vector spectrum. It is shown that, at low values of k_0L (k_0 is the acoustic wave number and L is characteristic array length), the leakage from the convective and subsonic components of the TBL can be substantial, even for relatively small gaps.

3:45

2pEA11. Comparisons of two encapsulating methods on the acoustic performance of a passive cylindrical array. Alan K. Walden, Thomas R. Howarth, Mark L. Pecoraro, and Allan C. Tims (Naval Res. Lab., Underwater Sound Reference Detachment, Orlando, FL 32856)

The purpose of this study was to determine the effects of encapsulation methods on the acoustic performance of a passive, cylindrical, high gain, broadband (multi-octave) array. Both an oil-filled boot and a polyurethane coating were considered. The array consisted of 36 lead titanate elements mounted in a 3 by 12 matrix along 180 deg of the circumference of a steel cylinder. Original intentions were to rely on the oil-filled booting to ensure performance void of transverse mode coupling between neighboring elements. Measurements of the oil-filled array showed a "scalloping" effect in the radiation patterns as well as significant disturbances throughout the receiving response [Howarth *et al.*, J. Acoust. Soc. Am. **91**, 2325–2326 (A) (1992)]. This study took the same array and encapsulated it in a polyurethane elastomer. Experimental data indicate that many of the perturbations notes in the oil-filled configuration were considerably diminished after potting. Performance comparisons between the two encapsulating methods shall be presented and discussed. [Work supported by NSWS/Carderock Division.]

4:00

2pEA12. Optimized constant beam width arrays. Jefferson A. Harrell (Jet Propulsion Labs., 4800 Oak Grove Dr., Pasadena, CA 91109) and Elmer L. Hixson (Univ. of Texas, Austin, TX 78712)

It has been previously shown by the authors [JAES **34**, 221 (April 1990); J. Acoust. Soc. Am. **91**, 2326 (A) (1992)] that the main beamwidth of a loudspeaker array can be held constant over an octave by the superposition of two arrays by using suitable filter functions. The beam patterns are identical at the end (design) frequencies, however, deviations occur at frequencies between the extremes. The deviations are representative of unwanted acoustic energy if the deviation is positive when referenced to the desired pattern. While the array has some error at these design frequencies (for example, undesired side and backlobes), the total error energy integrated over the octave may be greater than that of other arrays that use element weights that allow more error at the design frequencies. Presented is an algorithm to minimize the deviations between design frequencies while minimizing the error energies, which is based on a Wiener adaptation. The results are compared to hand-generated guesses. The impact of linear and nonlinear cost functions is considered.

4:15

2pEA13. Speed of sound in pure water as a function of temperature. Nykolai Bilaniuk and George S. K. Wong (Inst. for Natl. Measurement Standards, Natl. Res. Council, Ottawa, ON K1A 0R6, Canada)

In view of the adoption of the International Temperature Scale of 1990 (ITS-90), which defines the International Celsius Temperatures, t_{90}, the dependence on temperature of the speed of sound in pure water is examined. Drawing on the experimental data published previously [V. A. Del Grosso and C. W. Mader, "Speed of Sound in Pure Water," J. Acoust. Soc. Am. **52**, 1442–1446 (1972)], it is found that the change from the previous t_{68} scale is significant. At 100 °C, the difference between the two scales ($t_{68}-t_{90}$) is 0.026 °C, resulting in a difference of 0.022 m/s for the speed of sound. The speed of sound is fitted to a new fifth-order polynomial applicable over the t_{90} range 0–100 °C.

TUESDAY AFTERNOON, 18 MAY 1993 ADAM ROOM, 1:30 TO 4:45 P.M.

Session 2pMU

Musical Acoustics and Psychological and Physiological Acoustics: Auditory Organization in Music and Speech I: Theory, Phenomena, and Models

Punita G. Singh, Chair

Department of Psychology, McGill University, 1205 Doctor Penfield Avenue, Montreal, Quebec H3A 1B1, Canada

Chair's Introduction—1:30

Invited Papers

1:35

2pMU1. Auditory scene analysis: Theory and phenomena. Albert S. Bregman (Psychol. Dept., McGill Univ., 1205 Dr. Penfield Ave., Montreal, PQ H3A 1B1, Canada)

Many natural listening environments face the auditory system with a jumble of overlapping sound-producing events, from which it must recover separate descriptions of the individual sounds (auditory scene analysis). Its most basic method is "primitive" auditory grouping, a pre-attentive process that analyzes the incoming signal into components and then uses certain acoustic relations among them to link them into sets that later-acting recognition processes will prefer to treat as coming from separate events. Components (or features) will be linked when they exhibit relationships to one another that would be very improbable had they actually come from unrelated events. The evidence for grouping, derived from different relations, is allowed to compete and collaborate, in the linking of subsets of components or features. In a mixture, the listener tends to hear these subsets as distinct but overlapping sound sequences, each with its own properties. The perceived qualities that can be affected by this organizing of data include the melodic and rhythmic qualities of the perceived sounds, their pitches, timbres, numerosity, temporal order, and even their perceived spatial positions.