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Audio Engineering Society
Chicago Section

Thursday, November 6th, 2003, 7:30 PM

The History and Future of Surround Sound

Presented by Tomlinson Holman

The next meeting of the Chicago section of the Audio Engineering Society will be held on Thursday, November 6th, 2003 at 7:30 PM at the Holiday Inn North Shore. Members and non-members are welcome.

In this presentation Mr. Holman will present the history of surround sound, followed by some informed speculation about the future of this new medium.

Tomlinson Holman has worked in the field of sound for over 30 years, with much of it spent investigating surround sound. He is best known for the development of the THX certification of professional and home theater equipment, and is president of TMH Labs. Mr. Holman is a Professor of Film Sound at USC's School of Cinema-Television and a Principal Investigator in the Integrated Media Systems Center there.

Mr. Holman is a Fellow of the Audio Engineering Society and a former Governor. He is an honorary member of the Cinema Audio Society and the Motion Picture Sound Editors. He is a fellow of the British Kinematograph Sound and Television Society and the Society of Motion Picture and Television Engineers.

Dinner will begin at 6:30pm with the presentation following at about 7:30pm. For menu information or to make dinner reservations, call Treasurer Simone Koo at (847) 523-5432 by noon on November 6. You can also reach Simone by calling his pager at (888) 597-8606 or 5978606@skytel.com. All AES members will receive a $1.00 discount on dinner. All student members (with student ID) will receive a $10.00 discount.

Meeting Location:
Holiday Inn North Shore in Skokie
5300 West Touhy Avenue Skokie, IL
(at the northeast corner of Touhy and Niles Center Road)

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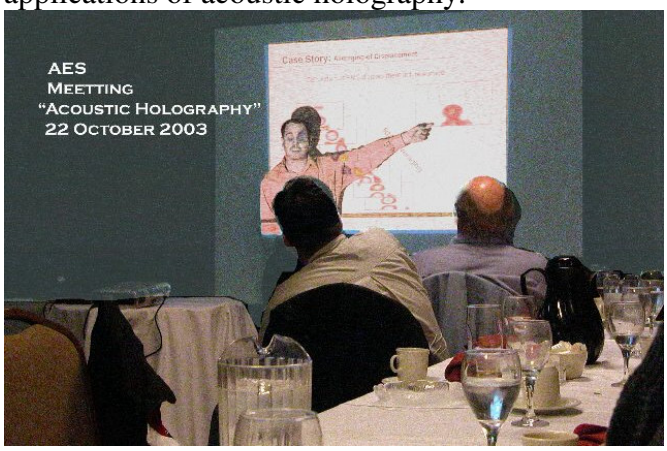
Last month's meeting:
On October 22, Marc Marroquin of Brüel and Kjær gave a presentation on the applications of acoustic holography.



Acoustic holography was first described in 1970's Acoustical Society Journal articles, and was the subject of some innovative demonstrations by Tom Burns in the 1990's. The main commercial application now is for noise source identification. The high processing speed of modern personal computers combined with large arrays of microphones has recently made acoustic holography a much more practical acoustical tool.

Mr. Marroquin first described a method known as Spatial Transformation of Sound Fields (STSF). A sound recording from a large array of microphones (often 96 of them) is made near the sound source in an anechoic environment. The multiple channels of sound are recorded directly into a computer. There the cross spectrum of the matrix of microphone signals is calculated. From this information the software can calculate the sound pressure and velocity at any point in space ahead of or behind the microphones. A reference microphone is often placed very closed to the estimated source of the sound. The signal from the reference microphone is used to help reject non-correlated sounds that are not of interest in the measurement.

Mr. Marroquin next described Non-Stationary Spatial Transformation of Sound Fields (NS-STSF). While STSF is largely a frequency domain tool, NS-STSF is largely a time domain tool. It offers the advantage of being able to measure sounds that evolve over time, such as start up noises and transients. It is also possible to remove echoes from the measurement. It is possible to observe the flow of sound energy from one part of a noise source to another. The NS-STSF is much more computationally intensive, and has only become practical in the last 5 years.

After discussing some of the theory of acoustic holography, Mr. Marroquin showed some practical measurements. Since most of the commercial application of holography has been in the automotive industry, he showed measurements of rotating tires, acoustic leakage through a truck door, and an animation of car engine noise location as a function of crank shaft position. He catered to his AES audience as well, and had prepared a set of speaker measurements. He measured the sound coming from a suitcase-style set of

satellite and subwoofer speakers before coming to the meeting. The excitation signal was a sine sweep from low to high frequency. The response of the speakers could be seen not only as a function of frequency, but also as a function of the location in the room. The radiation pattern of the speakers was easy to observe, in this case revealing some unwanted radiation emanating from the subwoofer cabinet.

Acoustic holography requires a large number of well-matched microphones. The phase matching must be better than 5 degrees. The spacing of the microphones should be no more than 1/3 to ½ of a wavelength. One simplification that can be used with STSF measurements is to sweep a line array of microphones in front of the sound source, rather than using a full rectangular grid.

Future advancements of the holography software will allow the sound field to extrapolated not only to the plane of the sound source, but to actually predict the sound coming around corners and contours of the sound source.

While acoustic holography has been used mainly for sound source identification of machinery, there may be several applications in the pro-audio industry. Some members speculated that acoustic holography could be a powerful tool for predicting the sound field of loudspeaker horns and arrays, where far-field measurements are not practical.

Email and Printed Mailing Lists

The Chicago Chapter distributes most of its meeting notices by email. By distributing these meeting notices via email, we can save our section the cost of mailing out the notices. By adding your name to the email list you will receive notice of meetings sooner, and will receive any last minute meeting changes, that are not feasible by regular mail. If you would like to start getting email notices, start receiving the printed notices by regular mail, or have any change in address please contact Tom Miller by the phone or email listed in the header.

Information about past and future meetings can always be found at the AES Chicago Section website at: www.aes.org/sections/chicago

AES Chicago Section
November Meeting Summary
What: The History and Future of Surround Sound
Who: Tomlinson Holman
When: Thursday, Nov 6th, 7:30 PM
Where: Holiday Inn North Shore, Skokie

Chicago AES Secretary
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