impulse response will be evaluated by convolution of the impulse response of all incident rays, appropriately delayed and spherically attenuated by the travel path, with the respective impulse response of each surface. The polar response of each surface will define the solid angle irradiated and the level will be used to determine the reflection order.

10:35–10:45

Break

Contributed Papers

10:45

3aAA7. A modified evaluation of energy parameters in ODEON 1.1 using Sabine's diffuse energy decay formulas. T. R. Januarsari (Dept. of Appl. Acoust., Salford Univ., Salford M5 4WT, England)

The lack of diffuse reflection in a room acoustic computer model ODEON 1.1 [created by Tech. Univ. of Denmark] is considered as one major technical shortcoming. This can lead to very poor estimation of the reverberation behavior of the room whose geometry is itself poorly diffusive. In order to overcome this problem, surfaces are considered to be partially specularly and partially diffusely reflecting, as quantified by absorption coefficient a and diffusion coefficient d, respectively. The diffuse energy, i.e., a proportion $d(1-a)$ of the incident energy, is assumed to be distributed uniformly inside the room and accumulating in an imaginary pool. By using Sabine diffuse energy decay formulas: $E(t)=E(t_0)\exp[-(t-t_0)/\tau_E]$, the diffuse sound energy coming into pool at any time t can be calculated. Thus the total diffuse energy accumulated in the pool at certain time t is added to the nondiffuse energy, and taken into account in evaluation of energy parameters. The prediction of RT and EDT in midfrequencies give better agreement with measured RT and EDT made in rectangular 1:50 model room, than those of origin program. [Research project for Master degree, supervised by Dr. Y. W. Lam.]

11:00

3aAA8. Including diffraction effects in image method solutions for sound fields in arbitrarily shaped rooms. Paul S. Kovitz (Penn State Univ., Graduate Prog. in Acoust., 117 Appl. Sci. Bldg., University Park, PA 16802)

The image method is often used by computer programs to model sound fields in rooms. Because programs that use the image method ignore the effects of diffraction, the programs fail to model the sound field correctly when a room has an arbitrary shape. A new computer program that attempts to address this limitation has been developed. The program models both geometrical and diffracted components of the sound field by combining the image method with infinite wedge theory. Experimental data are used to evaluate the validity of this new program.

11:15

3aAA9. Full-wave modeling of the transmission of sound over theater seats: Far-field investigation. Dominique J. Chéenne, Robert D. Kubik, Robert C. Maher, and Ezekiel Bahar (Dept. of Elec. Eng., 209 N WSEC, Univ. of Nebraska, Lincoln, NE 68588)

The full-wave theory [E. Bahar, J. Acoust. Soc. Am. **89**, 19–26 (1991)] is applied to a computer simulation of sound transmission over simplified rows of theater seats. The investigation is concerned with the acoustic response in the far field for variable angles of incidence. The model consists on 1, 3, 5, or 8 rows, both short and tall seats, with narrow and wide spacings, for a total of four seating configurations. The surface is described if terms of its adiabatic bulk modulus. The influence of seat spacing on the backscatter appears to be quite relevant for all angles of incidence regardless of the seat height. Widely spaced seats lead to more irregular responses than narrowly spaced seats. These results suggest the need for separation between the spectral and backscattered energy during future experiments. The near-field investigation of this problem is also under way and will include a comprehensive assessment of the model using experimental data obtained by others [J. S. Bradley, J. Acoust. Soc. Am. **90**, 324–333 (1991)].

11:30

3aAA10. Multiple source auralization progress report. David Prince (Architectural Tech. Dept., 231 ARCH, Univ. of Florida, Gainesville, FL 32611) and Rick Talaske (The Talaske Group, Oak Park, IL)

The problem of accurate spatial representation of large orchestras in binaural auralizations is attacked by convolving anechoic recordings of individual instruments with the room impulse responses simulated from each instrument location to a single listener location and subsequently mixed. Instrument directivity and power, orchestra member effects, individual pinna transfer functions, and headphone transfer functions are considered. Progress, techniques, limitations, and problems of this current research will be discussed. [Research supported by The Talaske Group, Inc.]