2:30

1pAO5. Calibration trials with multibeam sonars. Dezhang Chu, Kenneth G. Foote (Woods Hole Oceanogr. Inst., Woods Hole, MA 02543), Kenneth C. Baldwin, Larry A. Mayer, Andrew McLeod (Univ. of New Hampshire, Durham, NH 03824), Lawrence C. Hufnagle, Jr. (Northwest Fisheries Sci. Ctr., Seattle, WA 98112), J. Michael Jech, and William Michaels (Northeast Fisheries Sci. Ctr., Woods Hole, MA 02543)

A series of calibration trials have been performed with several multibeam sonars by means of the standard-target method. These have included multiple units of the Simrad SM2000 Multibeam Echo Sounder operating at 90 or 200 kHz, with external transmitter in each case. The principal measurements have been of the full two-dimensional directivity characteristics of the main lobes. Issues of sensitivity, linearity, dynamic range, and near-field effects have also been studied. [Work supported by NSF Grant No. OCE-0002664.]

2:45

1pAO6. A new multibeam echo sounder/sonar for fishery research applications. Lars Nonboe Andersen, Sverre Berg, Erik Stenersen, Ole Bernt Gammelsaeter, and Even Borte Lunde (Simrad AS, P.O. Box 111, N-3191 Horten, Norway, fish_research@simrad.com)

Fisheries scientists have for many years been requesting a calibrated multibeam echo sounder/sonar specially designed for fishery research applications. Simrad AS has, in cooperation with IFREMER, France, agreed on specifications for a multibeam echo sounder and with IMR, Norway for a multibeam sonar, and contracts were signed for development of such systems in January 2003. The systems have 800 transmitting and receiving channels with similar hardware, but different software, and are characterized by narrow beams, low-sidelobe levels, and operate in the frequency range 70–120 kHz. The echo sounder is designed for high operating flexibility, with 1 to 47 beams of approximately 2°, covering a maximum sector of 60°. In addition, normal split beam mode on 70 and 120 kHz with 7° beams for comparison with standard system is available. The sonar will be mounted on a drop keel, looking horizontally, covering a horizontal sector of ±30°, and a vertical sector of 45°. Total number of beams is 500, 25 beams horizontally with a resolution of ~3°, and 20 beams vertically with a resolution of ~4°. Both systems are designed for accurate fish-stock assessment and fish-behavior studies.

3:00

1pAO7. Midwater acoustic modeling for multibeam sonar simulation. Bart Buelens, Ray Williams, Arthur Sale (School of Computing, Univ. of Tasmania, Sandy Bay Campus, Hobart 7005, Tasmania, Australia, bart@sonardata.com), and Tim Pauly (Sonardata Pty. Ltd., Tasmania, Australia)

Simulation and modeling software has been developed to generate synthetic midwater multibeam data. Essentially, the simulator can be considered as a virtual test tank. In order to develop multibeam data analysis methods for fisheries research, it is essential to have a variety of test data sets available, which are ground truthed, georeferenced and corrected for vessel motion. Since equipment and ship time are expensive and data quality not always guaranteed, the simulator provides an effective alternative. The seabed and any objects in the water column such as fish and fish schools can be defined in a 3-dimensional space. A specification for a generic linear array multibeam sonar and its position in space and time can be chosen. The acoustic model implements the technique of acoustic ray-tracing to obtain the pressure at the transducer face, which is converted to individual samples by modeling the working of a digital multibeam system. Beamforming is performed on the fly, and both raw and beamformed complex data sets are generated. Current research on model validation, calibration and analysis techniques will be presented along with an outline of planned future research.

MONDAY AFTERNOON, 10 NOVEMBER 2003 SAN ANTONIO ROOM, 1:30 TO 5:15 P.M.

Session 1pED

Education in Acoustics and Musical Acoustics: Neat Acoustics Websites and Software for Teaching Musical Acoustics

Uwe J. Hansen, Cochair
Department of Physics, Indiana State University, Terre Haute, Indiana 47809

Thomas D. Rossing, Cochair
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Invited Papers

1:30

1pED1. Acoustics and vibration animations: A surprisingly successful website. Daniel Russell (Sci. & Mathematics Dept., Kettering Univ., 1700 W. Third Ave., Flint, MI 48532-4898)

For the past 8 years the author has been creating mathematically and physically correct computer animations for use in teaching acoustics to advanced undergraduate engineering and science majors [D. Russell, J. Acoust. Soc. Am. **106**, 2197 (1999)]. Compiling these animations, along with supporting text, on a web site (http://www.kettering.edu/~drussell/demos.html) has resulted in a surprising response from students, teachers, and professionals who have found the animations useful for their own presentations, study, or courses. Unsolicited recognition in the form of web awards and coverage in magazines adds weight to the usefulness of well-made animations for conveying difficult concepts to a wide audience. This presentation will showcase as many of the animations as possible, especially newer ones, including: oscillation, wave superposition, reflection and refraction, particle motion for various wave types, radiation from simple and complex sources, room modes, waves on strings and membranes, bending waves and boundary conditions, and the vibration of guitars and baseball bats. If time permits, some of the methods used to create the animations will be shared.

2:00

1pED2. Musical acoustics demonstrations. P. L. Hoekje (Dept. of Phys. and Astron., Baldwin-Wallace College, 275 Eastland Rd., Berea, OH 44017)

The ASA Musical Acoustics Demonstrations website (trial version at http://www.bw.edu/~phoekje) includes sound files, video clips, program code listings, and other material for demonstrations related to musical acoustics. Many of the sound demonstrations may be experienced either as expositions, in which the phenomena are explained before they are presented, or as experiments, in which the explanation comes after listeners have had the opportunity to draw their own conclusions. Suggestions are provided for apparatus construction and classroom experiments, as well as for building simple musical instruments. Software is recommended if it is available free and compatible with multiple personal computer operating systems. For example, Audacity (http://audacity.sourceforce.net) is a sound file editor and analyzer that can be used to visually represent sounds and manipulate them. Source files are included for the synthesized sound examples, which were created in Csound (http://csounds.com), so that interested users may create their own variations. Source code is also included for visual demonstrations created in Visual Python and Python (http://www.python.org), an efficient, high level programming language. Suggestions, criticisms, and contributions are always welcome! [Work supported by ASA and Baldwin-Wallace College.]

2:30

1pED3. Teaching acoustics online. Andrew Morrison and Thomas D. Rossing (Dept. of Phys., Northern Illinois Univ., DeKalb, IL 60115)

We teach an introductory course in musical acoustics using a Blackboard. Students in this course can access audio and video materials as well as printed materials on our course website. All homework is submitted online, as are tests and examinations. The students also have the opportunity to use synchronous and asynchronous chat rooms to discuss the course with each other or with the instructors.

3:00–3:15 Break

3:15

1pED4. ASA Education in Acoustics website as new portal. E. Carr Everbach (Eng. Dept., Swarthmore College, 500 College Ave., Swarthmore, PA 19081)

The ad-hoc On Line Education Committee of the Acoustical Society of America was charged in 2002 with revitalizing the Education in Acoustics website. A web portal, demonstrated at the Nashville, TN, meeting in April, 2003, consists of a fanciful view of Lord Rayleigh's drawing room. Items within the room are "hot" and lead the visitor to web links whose content is related to the technical committee areas and other areas of interest. The links are configurable via a web (MySQL) database interface so that they can be manipulated without programming. Current efforts include populating the portal with links and adding active content in topic areas that need to be strengthened.

3:45

1pED5. Software tools for developing an acoustics multimedia CD-ROM. Todd W. Bigelow and Paul A. Wheeler (Utah State Univ., 4120 Old Main Hill, Logan, UT 84322 big@cc.usu.edu)

A multimedia CD-ROM was developed to accompany the textbook, *Science of Sound*, by Tom Rossing. This paper discusses the multimedia elements included in the CD-ROM and the various software packages used to create them. PowerPoint presentations with an audio-track background were converted to web pages using Impatica. Animations of acoustic examples and quizzes were developed using Flash by Macromedia. Vegas Video and Sound Forge by Sonic Foundry were used for editing video and audio clips while Cleaner by Discreet was used to compress the clips for use over the internet. Math tutorials were presented as whiteboard presentations using Hitachis Starboard to create the graphics and TechSmiths Camtasia Studio to record the presentations. The CD-ROM is in a web-page format created with Macromedias Dreamweaver. All of these elements are integrated into a single course supplement that can be viewed by any computer with a web browser.

Contributed Papers

4:15

1pED6. Numerical modeling of the acoustic guitar. Antoine Chaigne (ENSTA-UME, Chemin de la Hunière, 91761 Palaiseau cedex, France), Grégoire Derveaux, Patrick Joly, and Eliane Bécache (INRIA, 78153 Le Chesnay cedex, France)

An interactive DVD has been created, based on a numerical model of the acoustic guitar. In a first chapter, the retained physical model is described and illustrated, from the pluck to the 3D radiation field. The second chapter is devoted to the presentation of the numerical tools used for solving the equations of the model. Numerical simulations of plate vibrations and radiated sound pressure are shown in the third chapter. A number of simulated sounds are presented and analyzed in the fourth chapter. In addition, the DVD includes a discussion between a guitar maker, an acoustician, a guitar player and a mathematician. This discussion is entitled "towards a common language." Its aim is to show the interest of simulations with respect to complementary professional approaches of the instrument. This DVD received the Henri Poincaré Prize from the 8th Research