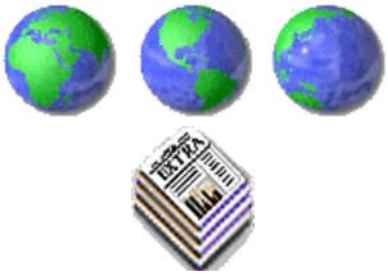
Acoustical Society of America
148th Meeting Press Release



NEW VIBRATIONS IN BASEBALL BATS, EXTREME SOUND EFFECTS, AND THE ACOUSTICS OF EMOTION AT UPCOMING MEETING

FOR IMMEDIATE RELEASE

Melville, New York, October 12, 2004

Does hitting a baseball on the "sweet spot" of a bat really produce the best results? Can stuttering episodes be triggered by encountering certain kinds of syllables in a sentence? How can sound clean up hazardous waste? These and other questions will be addressed at the 148th Meeting of the Acoustical Society of America, to be held November 15-19, 2004 in San Diego at The Town and Country Hotel (500 Hotel Circle North, San Diego, CA 92108). Over 750 papers will be presented. The ASA is the largest scientific organization in the United States devoted to acoustics, with over 7000 members worldwide.

WORLD WIDE PRESS ROOM

We encourage you to visit ASA's "World Wide Press Room" (located at http://www.acoustics.org/press) before and during the meeting. By the week of October 27, the site will contain lay-language versions of selected meeting papers. These papers will enable you to cover the meeting, even if you can't leave your desk.

PRESS LUNCHEON AT MEETING

On Tuesday, November 16, ASA will hold a press luncheon, from 11:30 a.m. to 1:30 p.m., featuring speakers on numerous topics that will be presented at the meeting. The speakers and

location will be announced in a subsequent release. Reporters interested in attending the luncheon should return the reply form at the end of this release or contact Ben Stein (301-209-3091, bstein@aip.org).

ASA SCIENCE WRITING AWARD

At a plenary session on November 17, ASA will present its 2004 Science Writing Award in Acoustics for Journalists to Ian Sample for his piece "The Sound of Sunshine" published in the Guardian newspaper on July 24, 2003. Steve Thompson wins the award for acoustics professionals for his "Tutorial on Microphone Technologies for Directional Hearing Aids," published in The Hearing Journal. Information on how to enter next year's science writing award can be obtained by contacting Ben Stein at bstein@aip.org.

PROGRAM HIGHLIGHTS

The following items describe some highlights from among the many papers being given at the meeting. The first number of the paper code indicates the day of the talk, with "1" denoting Monday (November 15),"2" denoting Tuesday (November 16), and so on, up to "5" for Friday (November 19). Here are some highlights from among the many papers being given at the meeting. Full abstracts of the papers mentioned below can be viewed by typing in the last name of the author or the appropriate paper code at the ASA Meeting Abstracts database: http://asa.aip.org/asasearch.html.

POTENTIAL EXPLANATION FOR MARINE MAMMAL STRANDINGS

The mysterious beachings of whales following naval exercises are a topic of increasing interest. Last year in the journal Nature, researchers suggested that some version of decompression sickness might be involved. Meanwhile, recent studies show that marine mammals might commonly carry "supersaturated" levels of nitrogen, in which a higher-than-normal amount of nitrogen gas is dissolved in their bodies. Now, Lawrence Crum of the University of Washington (lac@apl.washington.edu) and his colleagues have performed a series of experiments that suggest even modest levels of underwater sound could trigger bubble formation in a liquid of

supersaturated nitrogen. The supersaturation levels can result in very large nitrogen bubbles, which could have potentially deleterious biological effects. Crum will present preliminary results of these experiments, which did not require the participation of animals, in efforts to better understand the causes of the beachings (2pAB8). In another talk at the same session, Paul Nachtigall of the Hawaii Institute of Marine Biology (nachtiga@hawaii.edu) will present hearing studies of a stranded infant dolphin undergoing recovery. Representing the first-ever studies of a newly born marine mammal, the work is part of an effort to understand and protect the important hearing capabilities of marine mammals in the ocean (2pAB4).

NEW VIBRATIONS IN BASEBALL, GOLF AND CRICKET EQUIPMENT

Studying the sounds and vibrations of sports equipment helps designers improve their products, enabling athletes to reach new, higher levels of performance. It also can dispel longstanding misconceptions in sports. New research suggests that the spot on a baseball bat that feels the best to a hitter (i.e., transmits the least vibration to the hands) may not really be the spot that can send the ball the farthest distance. Dan Russell of Kettering University in Michigan (drussell@kettering.edu) will present surprising new discoveries on the baseball bat's "sweet spot," conventionally defined as a region, approximately 5 to 7 inches from the "barrel" end, where the bat exhibits the least vibration and gives the ball maximum propulsion. Robert Collier of Dartmouth College (Robert.d.collier@dartmouth.edu) will present newly detailed studies on how the different kinds of vibrations in a baseball bat--from the "crack" to the "thunk"--can provide important acoustic cues to baseball players in the field. In a quest to design a better bat for the sport of cricket, highly popular in countries such as England, Australia, and India, Sabu John and colleagues at RMIT University in Australia (sabu.john@rmit.edu.au) are taking advantage of the open-ended nature of cricket rules, which place no restrictions on the bat handle's shape or material composition. Exploiting their knowledge of mechanical vibrations, the researchers will present tests of various shapes and materials for the bat handle. Exploring the world of different vibrations that exist in golf balls and various parts of the golf club, Tom Mase of Michigan State University (tmase@egr.msu.edu) will show, for example, how varying the stiffness properties at the core of a golf ball affects how far the ball flies. (Session 4aSA)

NEW ULTRASOUND TECHNIQUES FOR MEASURING BONE HEALTH

Jonathan Kaufman of CyberLogic, Inc. in New York (jjkaufman@cyberlogic.org) will present a portable ultrasound device for noninvasive assessment of bone for such diseases as osteoporosis. In a clinical study of 60 women ranging in age from 25-88, the device, known as QRT 2000, used ultrasound to measure bone mass in the women's heels. The researchers hope the low-cost, handheld device could be used by primary care physicians globally, including in the developing world, to routinely test the bone health of patients. (1pBB11). Monitoring the healing of a bone fracture is one of the more difficult things for physicians to determine. Currently, they must subjectively judge the rate at which temporary bone (the "callus") is replaced with permanent bone. Also, they look for increased stiffness at the fracture site, which may provide another sign of healing. Sabina Gheduzzi of the Unversity of Bristol (S.Gheduzzi@bristol.ac.uk) and her colleagues at the Universities of Bath and Southampton will present an ultrasound technique for objectively assessing the healing process in human long bones (such as those in the arm and thigh). By directing ultrasound at simulated fractures of various widths, they found that (1) fracture size influenced the amount of ultrasound that was re-radiated from the bone beyond the fracture and (2) even small fractures dramatically reduced, or "attenuated," the amount of ultrasound that crossed the fracture. The acoustical transmission properties of bone fractures offer hope that an ultrasound device can be developed to quantitatively measure fracture healing (1aBB7).

ACOUSTICALLY ENHANCED FISHING NETS FOR PREVENTING DOLPHIN DEATHS

Tens of thousands of dolphins, porpoises, and whales die every year as a result of being accidentally entangled in gillnets intended to catch fish. To address this issue, researchers have designed acoustically reflective nets that marine mammals can potentially detect with their natural sonar systems. Aran Mooney of the Hawaii Institute of Marine Biology (mooneyt@hawaii.edu) will present studies of cod and monkfish gillnets, including those enhanced with barium sulphate and iron oxide to increase their acoustic reflectivity. Mooney and colleagues determined that at reasonable distances bottlenose dolphins should be able to detect all the enhanced nets, and that increasing the stiffness of the nets may also be effective in making them detectable. (4pAB14) In separate work, a team of researchers at Scripps Institute of Oceanography and Hubbs-Sea World Research Institute (fsimonet@ucsd.edu) will investigate using artificial sonar systems to detect manatees, which are frequently killed in collisions with boats (3aAB6).

EXTREME SONO-EFFECTS

New science and applications continue to emerge from the process of aiming intense ultrasound at liquid tanks to create collapsed bubbles that produce light (sonoluminescence) or perform desired chemical reactions (sonochemistry). Michael Hoffman of Caltech (mrh@caltech.edu) and his colleagues will present a high-frequency (612 kHz), high power (4kW), pilot-plant scale sonochemical reactor for breaking down organic chemical pollutants into simpler, nonhazardous chemicals. In their studies, the sonochemical reactor broke down trichloroethylene, dichloromethane, and phenol, at rates 2.5-7 times greater than previous designs (2pPA4). In the multibillion-dollar semiconductor industry, there has been no reliable way to monitor silicon wafers as they undergo dozens of crucial "megasonic" cleaning steps, in which the wafer is immersed in a liquid and blasted with very-high-frequency (megahertz) sound waves to remove impurities and prevent the formation of defects. Gary W. Ferrell of SEZ California Research Center, SEZ America, Inc. (gferrell@us.sez.com) will describe how multi-bubble sonoluminescence, which can occur as a byproduct of the megasonic cleaning process, yields light that can provide information on the removal of 100 nanometer-and-larger particles from the silicon wafer. He will discuss efforts to develop a nanoscale optical damage probe to maximize cleaning and minimize damage to nanoscale circuit components (2pPA6). Also at the session: Ken Suslick of the University of Illinois (ksuslick@uiuc.edu) will describe extraordinarily intense single-bubble sonoluminescence. Created in concentrated sulfuric acid containing noble gases, the bubbles reach measured temperatures of about 15,000 K and may mimic some conditions found inside stars. (2pPA3)

THE CAUSES OF STUTTERING: NEW INSIGHTS

What causes stuttering, a condition suffered by an estimated three million people in the U.S. alone? Finding the exact answer could help speech therapists develop improved strategies for treating those who suffer from the disorder. Previous studies have identified components of words (such as stressed syllables) and even parts of sentences that are more likely to trigger stuttering episodes, but the reasons for why this happens remain unclear. In efforts to pinpoint the causes even more precisely, Timothy Arbisi-Kelm of UCLA (timrbc@ucla.edu) and his colleagues suspected that stuttering occurred most frequently in syllables that are not only stressed, but "pitch accented," in which the stressed syllable becomes more prominent by increasing duration, loudness, and especially pitch. An example of the difference between normal stress and a pitch accent can be seen in the sentence, "The boy found a dollar." While the three words "boy," "found," and "dollar" all carry stressed syllables, the stressed syllable in "boy" and "dollar"

receives a greater degree of stress, i.e., a pitch accent, than that in "found." Confirmed in three individuals, the tendency of pitch-accented syllables to trigger stuttering episodes may provide new insights into the origins of this condition. (2aSC1)

TRULY "MICRO" PHONES

Of the billion microphones made every year for cell phones and other consumer electronics, most still rely on early 1960s technology. Now, manufacturers are rolling out MEMS microphones, silicon-based devices with crucial components on the scale of microns, or millionths of a meter. While many of the MEMS microphones are based on the same design as their larger, conventional counterparts, they are much more robust against shock, vibration, temperature, and humidity. They have unique capabilities: for example, one could fit thousands of MEMS microphones on a small chip. They have potential new applications: one could conceivably place a tiny microphone in a baseball to listen to what the ball "hears" during a home run. Session 2aEA is devoted to MEMS microphones and the new possibilities that they bring with them. Peter Loeppert of Knowles Acoustics (pete.loeppert@knowles.com) will discuss technical innovations that led to a low-cost, stable MEMS microphone for commercial applications (2aEA1). Michael Pedersen of the Corporation for National Research Initiatives (Pedersen@mems-exchange.org) will explain how MEMS microphones could be used for bio-chemical detection (2aEA7).

ULTRASOUND INSPECTION OF LARGE AIRLINERS

Ultrasound is playing a vital role in checking for manufacturing defects in the production of the Airbus A380, the giant, 555-seat airliner that will enter service in 2006. The Airbus extensively uses Glare, a new aluminum-fiberglass composite, which helps to minimize the three-deck airplane's weight and maximize its fuel efficiency. Although traditional ultrasound scanning techniques are currently being used to inspect the composite, Stefan A. L. Stijlen (s.a.l.stijlen@tnw.tudelft.nl) of the Delft University of Technology and his colleagues are investigating a new ultrasound technique designed specifically to catch Glare-related defects in the A380. Conventional techniques only try to detect Glare-related defects and possibly pinpoint their depth. The new technique, in addition, also can potentially characterize the type of defect qualitatively (e.g., fatigue cracks) and quantitatively (e.g., percentage porosity, crack size, etc.). Such a technique may lead to more sophisticated quality control in the manufacture of these state-of the-art airplanes. (4aSA3)

OCEAN NOISE AND MARINE MAMMALS

In the ocean, marine mammals depend much more on sound than vision. Gerald D'Spain of the Scripps Institution of Oceanography (gld@mpl.ucsd.edu) and Doug Wartzok of Florida International University will give a tutorial lecture on ocean noise and its effects on marine mammals, a subject that many ASA members are vigorously investigating. D'Spain and Wartzok will present the scientific issues pertaining to this subject. They will discuss basic physics of sound in the ocean as well as long-term trends of ocean noise. They will review the biology of marine mammals, particularly their production, reception, and use of sound in monitoring their environment, social interactions, and natural sonar systems ("echolocation"). D'Spain and Wartzok will also discuss the extensive gaps in existing knowledge and will discuss areas of needed research. (Paper 1eID1)

THE ACOUSTICS OF EMOTION

As computers improve their ability to both recognize and mimic human speech, researchers are

beginning to explore such new realms as "automatic emotion recognition" and "emotional speech synthesis," in which machines would respectively recognize human emotion and to generate emotions in synthetic speech. To these ends, Serdar Yildirim (yildirim@usc.edu) and colleagues at the University of Southern California obtained acoustic characteristics of four different emotions. According to the researchers, speech that displays anger and happiness has similarities: longer duration, shorter silences between words, and higher pitch. Sadness is distinguished from other emotions with its lower acoustic energy and longer silences between words. Interestingly, they found that the difference between happiness and anger and sadness and neutral emotions is better heard in the pronunciation of back vowels, those in which the tongue is positioned towards the back of the mouth (such as the "ah" in father), as opposed to front vowels (such as the "ih" in bit). (1aSC10)

MAKING YOUR COMPUTER LAUGH

Shiva Sundaram of USC (ssundara@usc.edu) will discuss a technique to synthesize human laughter, a complex mode of expression that varies greatly from individual to individual. The model attempts to capture the diversity of laughter while aiming to produce highly individualized expressions of mirth. People use laughter to express a happy or funny context or to render a positive response in conversation. Similarly, this technique aims to make the expression of laughter in computer-generated speech more effective and natural. (1aSC11)

CLASSROOM ACOUSTICS: REAL-WORLD IMPLEMENTATION

Crucial for a proper learning environment, but surprisingly overlooked in many schools, good classroom acoustics means that a student can hear the teacher and classmates clearly without having to filter out excessive ventilation noise and echoes. With the recent introduction of the ANSI (American National Standards Institute) standard for classroom acoustics, people are now beginning to implement the standard in new and existing schools. The complex efforts to adopt the standard in new and renovated Los Angeles schools will be discussed by Angelo Bellomo (abellomo@lausd.k12.ca.us), the director of the Office of Environmental and Health Safety in the LA Unified School District (4aAA1). Arthur Hallstrom ahallstrom@trane.com), an engineer at Trane, will provide a manufacturer's perspective of current and low-noise HVAC (heating, ventilation, and air conditioning) products and the resulting classroom sound levels (4aAA3). Florida-based acoustician Gary Siebein (gsiebein@siebeinacoustic.com) will discuss a multidisciplinary effort between architects, contractors, acoustical consultants, and a school board to design a prototype elementary school to meet the standard (4aAA4). Ohio-based acoustician Angelo Campanella (a.campanella@att.net) will present some low-cost solutions for improving classroom acoustics; an example includes using carpets and chalk and cork boards to reduce room echoes. (4aAA5). David Lubman (dlubman@ix.netcom.com) will discuss the acoustical renovation of portable classrooms for hearing-impaired pupils in California's Riverside County (4aAA7). Louis Sutherland (lou-sutherland@juno.com), an acoustical consultant in Southern California, will discuss efforts to accelerate adoption of the standard, which is voluntary and how its consideration by State governments in developing new school building codes is increasing (4pAA3). Other papers will discuss classroom acoustics efforts and studies in Philadelphia (5aAA7), England (4pAA1 and 4pAA2), New Jersey (4pAA4), Japan (4pAA5), and Mexico (4pAA7).

TIME-REVERSED ACOUSTICS FOR COMPOSITE MATERIALS

Alexander Sutin of Artann Laboratories in New Jersey (asutin@artannlabs.com) will demonstrate a new method for detecting subtle damage in composite materials by using time-reversed acoustics.

In this approach, a device sends a short pulse of ultrasound to a material and detects the long echo caused by the initial pulse as it spreads out, as well as multiple reflections of the wave bouncing like a ping-pong ball from the boundaries of the tested object. The recorded signal is played back, generating a time-reversed version of the initial ultrasound wave. This "time-reversed wave" exactly repeats the path of the initial wave and focuses in time and space at the receiver. Any subtle defect, which may appear in the material, changes the route of the ping-ponging wave and affects the refocusing of the time reversed echo that allows it to find hidden defects. (3aPA12)

VIEWING THE COMPLETE MEETING ABSTRACTS

To read the full meeting abstracts of the papers mentioned above, go to http://asa.aip.org /asasearch.html and type in the the last name of the author or the associated paper code. Entire sessions can be viewed by typing in the session code and an asterisk, e.g., "2pMU*."

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