Meeting of Accredited Standards Committee S2 on Mechanical Shock and Vibration

to be held jointly with the

U.S. Technical Advisory Group (TAG) Meeting for ISO/TC 108 Mechanical Vibration and Shock

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Accredited Standards Committee S2 on Mechanical Shock and Vibration. Working group chairs will present reports of their recent progress on writing and processing various shock and vibration standards. There will be a report on the interface of S2 activities with those of ISO/TC 108 (the Technical Advisory Group for ISO/TC 108 consists of members of S2, S3, and other persons not necessarily members of those committees) including a report on the current activities of ISO/TC 108, with focus on a report on the meeting that was held in Kobe, Japan from 4–13 September 1991.

WEDNESDAY MORNING, 6 NOVEMBER 1991 WEST ALABAMA, 8:00 TO 11:55 A.M.

Session 4AO

Acoustical Oceanography: Open Workshop on Acoustical Determinations of Small-Scale Physical Ocean Structure

Louis Goodman, Cochair
Naval Underwater Systems Center, Newport, Rhode Island 02841

Alan Brandt, Cochair
Office of Naval Research, 800 North Quincy Street, Arlington, Virginia 22217-5000

Chair's Introduction—8:00

Invited Papers

8:05

4AO1. Acoustic propagation and oceanic fine structure. Robert Pinkel and Steven Anderson (0213 Marine Physical Lab., Scripps Inst. of Oceanogr., La Jolla, CA 92093)

Internal waves distort the sound-speed field in the sea. This time variable distortion causes fluctuations in acoustic intensity and phase in forward transmission experiments. Initial efforts to predict the spectrum of internal wave-induced phase fluctuations were successful. Corresponding success was not achieved in the prediction of acoustic intensity, which is sensitive to smaller vertical scales than phase. Are the oceanic environmental models inaccurate or are the relevant scattering models in error? Here, a statistical picture of the fine-scale wave field is presented. The data consist of 10 000 profiles of density and sound speed, from the sea surface to 560 m, collected over a 20-day period. Vertical wave-number-frequency spectra of sound-speed anomaly are estimated from these profiles. Of relevance is the frequency dependence of the spectrum at the vertical wave number corresponding to the Fresnel scale of a given acoustic experiment. In an Eulerian frame, where vertical advection influences the observations, the frequency dependence varies significantly with vertical wave number. The form, as well as level, of the power spectrum of log intensity is dependent on the Fresnel scale of the experiment. Since estimation of the Fresnel scale is sometimes associated with significant uncertainty, the shape of the log amplitude spectrum might prove a valuable guide to the scattering physics.

8:30

4AO2. Observations of surface waves and Langmuir cells. Jerome A. Smith (Scripps Inst. of Oceanogr., A-013 UCSD, La Jolla, CA 92093-0213)

A suite of measurements were made recently (February–March 1990) as part of the "Surface WAve Processes Program" (SWAPP). Included were measurements from two surface-scanning Doppler sonar systems, operated at 75 and 195 kHz. These were designed and operated with surface waves and mixed layer motions specifically in mind. The estimated surface velocity fields provide detailed information about both the surface waves and underlying low-frequency motions, such as Langmuir circulation. A variety of phenomena, such as surface wave breaking, Langmuir circulation, and the evolution of the directional-frequency spectrum, can be tracked as conditions changed in time. A rapidly profiling CTD system provided profiles of *T*, *S*, and density versus time (every 130 s) and depth (over the top 400 m of the ocean). These complement especially the measurements of Langmuir circulation, and help to describe the accompanying deepening of the mixed layer under the influence of wind and waves. [Work supported by ONR.]

8:55

4AO3. On the use of sonar to study breaking waves and dispersion. S. A. Thorpe, M. Curé, and M. White (Dept. of Oceanogr., The University, Southampton SO9 5NH, U.K.)

Measurements using side-scan sonar have been made in a fresh-water lake, Loch Ness. A 250-kHz side-scan sonar has been used to detect breaking waves and to measure the proportion of waves that are breaking and producing bubble clouds as a function of wind speed. General agreement is found with earlier estimates using *in-situ* probes [Longuet-Higgins and Smith, J. Geophys. Res. **88**, 9823–9831 (1983); Weissman, Atakturk, and Katsaros, J. Phys. Oceanogr. **14**, 1608–1619 (1984)]. Bands of bubble clouds indicating areas of local convergence are observed using 80- and 90-kHz sonar. The observed convergence speeds and persistence times of the bands are used to derive estimates of lateral, cross-wind, dispersion rates of floating particles as a function of environmental conditions. [Work supported by ONR and UK NERC.]

9:20–9:30

Break

9:30

4AO4. Testing ocean internal wave models using the acoustic stochastic inverse. Terry E. Ewart and Stephen A. Reynolds (Appl. Physics Lab. and School of Oceanogr., Univ. of Washington, Seattle, WA 98105)

The role that acoustic stochastic inverse methods can play in assessing evolving internal wave models is discussed. Included is an overview of the use of oceanographic instrumentation and acoustic measurements to determine ocean stochastic behavior. This work is motivated by the internal wave modeling effort discussed at the 1991 A'ha Huliko'a meeting. At that meeting, recent developments in the understanding of ocean dynamics and their relation to a "next generation" internal wave model were discussed. The implication of these new ideas to the standard assumption of random-phase two-point statistics must be called to question. Before an experiment to test these developments can be proposed, oceanographic/acoustic sampling strategies must be designed. Examples will be shown that demonstrate how acoustic measurements, made simultaneously with traditional oceanographic observations, enhance the ability to interpret the internal wave environment.

9:55

4AO5. Acoustic scattering from a buoyant plume. Louis Goodman, Diane Szargowicz (Naval Underwater Syst. Ctr., Newport, RI 02841), and John Oeschger (Univ. of Rhode Island, Kingston, RI 02881)

A recent model of acoustic scattering from ocean temperature microstructures (Goodman, 1990) has