the surface. Due to the different angle of arrival, the direct-path and surface-reflected signals have different Doppler shifts. The Torpedo Detection Algorithm (TDA) employs the fast orthogonal search (FOS) algorithm for high-resolution spectral analysis to detect the closely spaced direct-path and surface-reflection signals. When a direct-path and surface-reflection are found, an automatic alert of a torpedo detection is initiated. In simulation, a torpedo is detected 20 times out of 20 as it travels from 5000 to 500 m from the receiver. Simple trigonometric expressions are used to estimate the torpedos range given the two frequencies estimated by FOS and *a priori* information about the torpedo speed and depth.

2:30

4pUWa3. A comparison of mine counter measure performance models. Andrew Holden (Dstl. Winfrith, Dorchester, DT2 8WX, UK, apholden@dstl.gov.uk)

Mine counter measure (MCM) sonar systems perform the task of detection and classification of marine mines that are typically laid in shallow water environments. Currently, there are several MCM performance models in use that can predict the performance of MCM sonars. This paper gives a brief description of some these models and gives a comparison of their performance predictions for several shallow water scenarios. All the models examined are self contained packages that can model the entire problem—the sonar, the environment, and the target. They are considered to be energy models in that only the intensity of sound received from various parts of the environment is modeled while phase calculations are ignored. The results show that the models can give good agreements with each other for some scenarios. In some other scenarios the agreement is not so good and reasons are given to show why this happens.

2:45

4pUWa4. Tank experiments and model comparisons of shallow water acoustics over an elastic bottom. Jon M. Collis, William L. Siegmann (Rensselaer Polytechnic Inst., Troy, NY 12180, collisj@rpi.edu), Michael D. Collins, Erik C. Porse, Harry J. Simpson, and Raymond J. Soukup (Naval Res. Lab., Washington, DC 20375)

A series of tank experiments are being conducted in order to obtain high quality data for acoustic propagation in environments with sloping elastic bottoms. Such problems can now be solved accurately with the parabolic equation method, which is being used to model the experiment. This paper will present results of the initial experiments and discuss plans for upcoming experiments, which will include propagation onto land. The initial experiments involved a broadband source over a block of PVC that was suspended in deionized water. Time series were collected at 100 to 300 kHz on horizontal and vertical arrays for two source positions. [Work supported by the Office of Naval Research.]

3:00

4pUWa5. Adjoint-based control of nonlocal boundary conditions for Claerbout's wide-angle parabolic approximation. Matthias Meyer and Jean-Pierre Hermand (Dept. of Optics and Acoust., Univ. Libre de Bruxelles, av. F-D. Roosevelt 50 - CP 194/05, B-1050 Brussels, Belgium)

This paper applies the concept of optimal boundary control for solving inverse problems in shallow water acoustics. A continuous analytic adjoint model is derived for a wide-angle parabolic equation (WAPE) using a generalized nonlocal impedance condition at the water-bottom interface. While the potential of adjoint methodology has been demonstrated for ocean acoustic tomography, this approach combines the advantages of exact transparent boundary conditions for the WAPE with the concept of adjoint-based optimal control. In contrast to meta-heuristic approaches the inversion procedure itself is directly controlled by the waveguide physics and, in a numerical implementation based on conjugate gradient optimization, much fewer iterations are required for assessment of environments that are supported by the underlying subbottom model. Furthermore, since regularization is important to enhance performance of full-field acoustic inversion, special attention is devoted to applying penalization methods to the adjoint formalism. Regularization incorporates additional information about the desired solution to stabilize ill-posed problems and identify useful solutions, a feature that is of particular interest for inversion of field data sampled on a vertical array in the presence of measurement noise and modeling uncertainty. Results show that the acoustic fields and the bottom properties embedded in the control parameters are efficiently retrieved.

3:15

4pUWa6. Line-integral prediction for horizontal coherence in deep-water propagation. Michael Vera (Univ. of Southern Mississippi, 730 E. Beach Blvd., Long Beach, MS 39560, michael.vera@usm.edu)

Some of the characteristics of an acoustic signal propagating to basin-scale ranges in the ocean can be estimated using line integrals along deterministic ray paths. These line-integral approximations involve the statistics of the internal-wave field. The success or failure of the integral expressions can be analyzed by comparison to parabolic-equation simulations through multiple realizations of the stochastic internal-wave field. One acoustic characteristic of interest is the length scale of acoustic horizontal (cross-range) coherence. Recent work comparing integral predictions of horizontal coherence length to values from simulations of the North Pacific Acoustic Laboratory experiment yielded mixed results. Additional comparisons will be discussed for acoustic propagation paths that are not impacted by range-dependence in the bathymetry or background sound-speed profile. These simulations will employ a single sound-speed profile and a deep, range-independent bottom. The comparisons can yield some insight into the accuracy of the integral estimate; they will not be influenced by bathymetric interaction or range dependence in the background sound speed.

3:30

4pUWa7. Decomposition method in constructing simulation models of parametric location for statistically irregular mediums. Irene Starchenko (TSURE, 347928, Taganrog, GSP-17a, Nekrasovskiy, 44, Russia, star@tsure.ru)

In using parametric arrays for the purposes of distant sounding in a water medium it is necessary to take into account the probable characteristics of acoustic signals. In this case the modeling of processes is especially important, because experiments in natural conditions are not always possible. In the case of parametric location the medium plays the very important function of formation of the parametric array. Results will be discussed.