



Seminar Series in Applied Mathematics

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*Inverse Acoustic Problems in Shallow Oceans:
a survey of some recent work*

Tuesday, October 10, 2000
3:15 pm
Pierce 120

Abstract: Object recognition problems in the ocean include two kinds of problems: recognition of a wave-impenetrable object, and recognition of a wave-penetrable object. Recently, R. Gilbert, T. Scotti, A. Wirgin, and Y. Xu have obtained a fast, robust method for the case of a wave impenetrable object in a shallow ocean with a rigid bottom.

Efficient solution of the forward transmission problem is a prerequisite for solution of an acoustic inverse problem. We have worked primarily with two models: the widely-used five parameter elastic model, and the twelve parameter Biot-Stoll model of a poro-elastic seabed. Buchanan-Gilbert have implemented both a parabolic approximation and a modal solution for the case of a poro-elastic half-space. Transmission loss for a constant coefficient, poro-elastic sediment calculated by parabolic approximation were found to be in good agreement with that calculated using our analytic solution. Depending on how coarse the sediment is, parabolic approximation is quantitatively accurate from one to several hundred meters on outward. Interestingly it is qualitatively accurate to within a few tens of meters however. Recent calculations of Buchanan-Gilbert have been made for the acoustic farfield with a poro-elastic seabed over an elastic and over a slightly porous seabed obtain.

Work with John Lin has centered on the use of transmutation theory to construct the far-field for non-homogeneous oceans.

Refreshments will be available starting at 3:00pm.

For additional information contact Patrick Miller (216-5452) or Yi Li (216-5433).
