
Marine Physical Laboratory

Postgraduate Support for Acoustics and Signal Processing in Waveguides Bounded by Inhomogeneous Biot Type Sediments

W. S. Hodgkiss

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Abstract

A range-dependent model incorporating the Biot theory of acoustic propagation in a fluid-filled porous media was implemented and used to investigate the optimum frequency of propagation in shallow water waveguides at high frequency.

Research Objectives

The objective of this effort was to implement a range-dependent model incorporating the Biot theory of acoustic propagation in a fluid-filled porous media and then use this model to investigate issues related to high frequency propagation in shallow water waveguides.

Research Summary

Biot developed a theory for acoustic propagation in fluid-filled porous media which predicts the existence of two compressional acoustic waves. The faster wave corresponds to the compressional wave propagating

References

through a solid medium and the slower wave rapidly attenuates. Collins at the Naval Research Laboratory extended the parabolic equation (PE) method to handle problems involving poro-elastic layers [1]. This code was used to investigate the optimum frequency of propagation in very shallow water waveguides at high frequency (e.g. coastal shallow water regions). The results of this research are reported in [2].

References

M.D. Collins, W.A. Kuperman, and W.L. Siegmann, "A parabolic equation for poro-elastic media," J. Acoust. Soc. Am. 98: 1645-1656 (1995).

A. Abawi, W.S. Hodgkiss, W.A. Kuperman, and M.D. Collins, "On measuring sediment/Biot properties in shallow water at moderate to high frequencies," J. Acoust. Soc. Am. 96: 3265 (1994).

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Office of Naval Research (3)
Department of the Navy
Ballston Tower One
800 North Quincy Street
Arlington, VA 22217-5660
Atten: Robert Gisiner, Code 3410A

Regional Director (1)
ONR Detachment
San Diego Regional Office
4520 Executive Drive, Suite 300
San Diego, CA 92121-3019

Commanding Officer (1)
Naval Research Laboratory
4555 Overlook Avenue, S.W.
Attn: Code 2627
Washington, D.C. 20375-5320

Defense Technical Information Center (4)
8725 John J. Kingman Road
Suite 0944
Ft Belvoir, VA 22060-6218