

引用本文(Citation):

朱祖扬, 王东, 周建平, 王秀明. 基于非饱和Biot-Stoll模型的海底沉积物介质声频散特性研究. 地球物理学报, 2012,55(1): 180-188,doi: 10.6038/j.issn.0001-5733.2012.01.017

ZHU Zu-Yang, WANG Dong, ZHOU Jian-Ping, WANG Xiu-Ming. Acoustic wave dispersion and attenuation in marine sediment based on partially gas-saturated Biot-Stoll model. Chinese J. Geophys. (in Chinese), 2012, 55(1): 180-188, doi: 10.6038/j.issn.0001-5733.2012.01.017

基于非饱和Biot-Stoll模型的海底沉积物介质声频散特性研究

朱祖扬¹, 王东¹, 周建平², 王秀明^{1*}

1. 中国科学院声学研究所, 北京 100190;
2. 国家海洋局第二海洋研究所, 杭州 310012

Acoustic wave dispersion and attenuation in marine sediment based on partially gas-saturated Biot-Stoll model

ZHU Zu-Yang¹, WANG Dong¹, ZHOU Jian-Ping², WANG Xiu-Ming^{1*}

1. Institute of Acoustics, Chinese Academy of Sciences, Beijing 100190, China;
2. Second Institute of Oceanography, State Oceanic Administration, Hangzhou 310012, China

摘要

参考文献

相关文章

Download: [PDF \(653KB\)](#) [HTML 1KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 利用含气非饱和Biot-Stoll模型研究了声波在海底表层沉积物介质中的传播,讨论了骨架耗散、含气饱和度对快纵波、慢纵波和横波速度和衰减的影响,并与Biot模型的结果进行了对比.研究表明:孔隙流体黏滞耗散与骨架耗散共同影响声波传播速度和衰减,低频情况下骨架耗散引起的衰减占主要地位,高频情况下骨架耗散引起的衰减较小;少量气体(<1%)的引入显著改变了快纵波速度,气体含量的变化对快纵波衰减影响很大,低频情况下气体对慢纵波速度的影响不大,而对横波速度的影响较大,气体含量的变化对慢纵波和横波衰减影响较小.利用超声波测量系统测量了一例杭州湾海底沉积物样品的纵波速度和衰减,当含气量趋近0%时,Biot-Stoll模型预测的纵波速度和实验测量结果较为一致.

关键词 海底沉积物, Biot-Stoll模型, 自由气体, 骨架耗散

Abstract: Acoustic wave propagation in marine sediments is studied based on a partially gas-saturated Biot-Stoll model. The effects of frame loss and free gas in pore water on the velocities and attenuations of fast P-wave, slow P-wave and shear wave are discussed, and the results are also compared with those of the Biot theory. It is shown that both the viscous loss of fluid and the friction loss of frame have effects on acoustic wave dispersion and attenuation, and at low frequencies the attenuation is mainly caused by the frame loss, while at high frequencies the attenuation caused by frame loss is relatively small. Less gas in the pore water will lead to significant changes in velocity of the fast P-wave, and free gas can hardly lead to any changes in velocity of the slow P-wave at low frequencies, but lead to great changes in velocity of shear wave. The variation of gas content will lead to apparent changes in attenuation of the fast P-wave, but small changes in attenuations of the slow P-wave and shear wave. One sample of the sediment from Hangzhou Bay is measured using an ultrasonic experiment system, and the experiment velocities are in good agreement with those obtained with partially gas-saturated Biot-Stoll model.

Keywords Marine sediment, Biot-Stoll model, Free gas, Frame loss

Received 2011-02-28;

Fund:

海洋公益性行业科研专项经费项目(200805005)和国家自然科学基金(10674148)资助.

About author: 朱祖扬,男,1981年生,博士,主要从事复杂介质中的波传播理论和信号处理研究. E-mail: zhuzuyang_2001@126.com.

链接本文:

<http://118.145.16.227/geophy/CN/10.6038/j.issn.0001-5733.2012.01.017> 或 <http://118.145.16.227/geophy/CN/Y2012/V55/I1/180>

[查看全文](#) [下载PDF阅读器](#)

Service

- [把本文推荐给朋友](#)
- [加入我的书架](#)
- [加入引用管理器](#)
- [Email Alert](#)
- [RSS](#)

[作者相关文章](#)

