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论文

水下低频声信号的激光探测及波的衰减

苗润才, 王玉明, 孟峰, 马静

陕西师范大学 物理学与信息技术学院, 西安 710062

摘要：

为了探测几十赫兹的低频水下声信号,建立了水下低频声信号的光学探测系统,得到了稳定、清晰的衍射图样.得到了衍射图样的宽度与声源距离的变化关系,声源距离越小,衍射图样越宽.当水下声波传至水表面后,实验上得到了表面声波的衰减特性,理论上得到了衍射图样的角宽度和液体表面波振幅的解析关系式.发现表面波振幅的衰减随距离是指数型衰减.并研究了衰减系数随频率的变化,频率不同衰减系数也不同,而且频率越大,衰减系数越小.

关键词： 水下声源 低频波 液体表面 衰减系数

Detection of Underwater Low-frequency Acoustic Signal and Wave Attenuation

MIAO Run-cai, WANG Yu-ming, MENG Feng, MA Jing

Institute of Physics and Information Technology, Shaanxi Normal University, Xi'an 710062, China

Abstract:

A simple measurement system is developed to study the optical effect of the low-frequency liquid surface wave which excited by underwater acoustic source. The high stability and clear diffraction pattern was observed experimentally.The relationship between diffraction patterns divergence angle and the distance of the acoustic signal was derived. Furthermore, with the increase of distance, the diffraction patterns divergence angle will decrease. The damping characters of the liquid surface wave was theoretically obtained when underwater acoustic wave spread to the liquid surface.The analytical expression between diffraction patterns divergence angle and the liquid surface wave amplitude was theoretically derived. It was found that the surface wave amplitude is exponent attenuation with the change of the horizontal distance.The attenuation coefficients is dependent on the frequency of liquid surface acoustic wave, and the greater frequency, the smaller attenuation coefficient.

Keywords: Underwater acoustic source Low-frequency wave Liquid surface Attenuation coefficient

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通讯作者: 王玉明(1987-),男,硕士研究生,主要研究方向为低频水下声信号的光学探测.Email:wangyumingx@126.com

作者简介:

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