

论文

气泡浓度对海洋激光雷达后向散射特性的影响

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摘要:

对不同浓度气泡幕水下激光雷达的后向散射特性进行了理论分析和实验研究。实验结果表明: 由于水中气泡群后向散射的原因, 在水下激光雷达整体后向散射信号的回波曲线上, 除了水体后向散射导致的信号峰以外, 还出现因气泡散射而导致的散射峰, 该散射峰叠加在水体的后向散射信号峰上, 其位置与水中气泡幕的位置直接相关, 而其幅值则受气泡幕的浓度影响。随着气泡幕浓度的增大, 其后向散射峰幅值相应增大, 这一点与理论分析结果一致, 而回波峰值的变化趋势则主要受水体质量的影响。

关键词: 水下气泡 气泡浓度 后向散射 激光雷达

Influence of bubble concentration on lidar backscattering characteristic

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Abstract:

The theoretical analysis and experimental research were performed for the light backscattering property of underwater bubble layers with different concentration. The experimental data show that there are the signal peaks caused by the bubble scattering, in addition to the signal peak caused by the water backscattering in the return wave curves of the underwater backscattering signals produced by lidar. The scattering peaks are overlain on the backscattering signal peaks of the water, the location is directly related to the location of the underwater bubble layers, and its amplitude is affected by the concentration of the bubble layers. It can be concluded from these curves that there is a second backscattering peak in the total backscattering signal curves caused by bubble layer underwater. The return time of the second peak is related to the distance between detector and bubble layer. The backscattering signal increases with the concentration increase of the bubble layer, which was predicted by theoretical analysis. The variation trend of the backscattering signal is mainly affected by the optical parameters of the water.

Keywords: underwater bubble bubble concentration backscattering lidar

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