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Monitoring fish weight using pulse-echo waveform metrics

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Abstract

Fish anatomical vertical dimensions are extracted from a time-of-flight analysis of fish echo shape using narrow-bandwidth echosounding of swimming individuals. These vertical dimensions fit a Gumbel distribution model and are successfully correlated with fish weight. The proposed method can be used to estimate the mean weight of fish in aquaculture cages as an alternative to target strength measurements. Full-waveform acquisition and signal correlation techniques permitted to increase the signal-to-noise ratio and to improve the performance against traditional envelope-based echosounding.

Keywords: aquaculture, fish biomass, echosounder, waveform, pulse compression, fish morphometrics

1. INTRODUCTION

This work proposes an experimental acoustical method to estimate individual fish weight distribution of freely swimming fish, with special interest in its application to the monitoring of aquaculture floating cages. Fish target strength (TS) determination is the basis for acoustical fish size estimation in acoustical fisheries stock assessment. [1, 2, 3, 4]. The TS of a scatterer is defined as the logarithmic expression of the ratio of the backscattered wave intensity at 1 m

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