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Fish behavior characterization research in aquaculture pond with mechanically scanned imaging sonar

Chih-yung Shen[1,2] and Wen-Miin Tian[2]
[1]CNA, Taiwan
[2]National Sun Yat-sen University, Taiwan

For a comprehensive management of fishery aquaculture, knowledge regarding fish size, quantity and behavior in the pond or cage are important controlling parameters. However, due to the constraint of underwater environment, underwater information is hard to collect and controlling parameters for aquaculture management are basically measured or estimated through indirectly procedures. Underwater acoustic systems are standard tools for monitoring fish and other mobile objects in marine and freshwater environments. Among them, the mechanically scanned imaging sonar systems with bottom-fixed, side-looking working configuration can collect high resolution underwater imagery and were employed for the quantification of fish length, fish position, fish swimming speed as well as fish behavior pattern. The current research was conducted at a milk fish pond (85*52*2 m in dimensions, with 10,800 milk fish of 40~42 cm in length) in Mituo, Kaohsiung city, Taiwan, with emphasis in the quantification of fish length and fish behavior. The pond bank can be covered or depicted by the sonogram with slant range at 40 m. Acoustic imagery with slant range setting at 5 m was selected and used for the measurement of the acoustic fish length. The echo with spindle shape, relative strong intensity was identified to be a fish target. Target images that parallel to the scanning direction were selected for the evaluation of the fish true length. The conclusion of the calculated fish length, based on 116 measurements and a statistical estimation procedure, was 45.4 cm, which is close to the initially estimated fish length (40~42 cm). As fish behavior concerned, it was evident that fish swam counter-clockwise more frequently than swam clockwise in the acoustical scanning area and revealed the preferred swimming route or behavior of the fish in this specific monitoring time and area.

Biography

Chih-Yung Shen has his expertise in underwater targets detection, and behavior analysis by using acoustic, noninvasive method. He is an Instructor in Chinese Naval Academy, Kaohsiung, Taiwan and taught physics, investigated method and technology, and astronomy. He is also a PhD candidate majoring in Department of Marine Environment and Engineering in National Sun Yat-Sen University, Kaohsiung, Taiwan. The foundation is a methodology that detected, identified, located fish and analyzed the fish behavior pattern by using mechanical scanned sonar system. This approach is responsive to underwater targets detection methods which cannot be done before.

chihyung0213@yahoo.com.tw

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