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Design, manufacture and the evaluation of Fluvial Acoustic Tomography System (FATS)

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Abstract

Underwater Acoustic Tomography (AT) system transmits acoustic waves into the water. The AT systems continuously measure the physical characteristics of the flow in rivers, seas and the oceans. The AT systems are synchronized via a GPS clock connectied to the satellites. Hence, the systems transmit the acoustic waves at the same time. The systems record the arrival time of acoustic waves. After analyzing the received signals, the flow characteristics would be estimated. In the present study, design, manufacture and performance of an AT system are investigated in the Kousar Channel, Malek-Ashtar University of Technology. Two Fluvial Acoustic Tomography Systems (FATS) were deployed on both sides of the channel. The horizontal distance between two systems was 127m. The FATS simultaneously transmitted sound pulses from the 30 kHz omnidirectional transducers every 60 seconds. The results showed that the underwater sound speed and the water temperature were 1482 m/s and 20.3 ˚C, respectively. The temperature sensor measured the surface temperature in the various points of the channel and confirmed the validity of the FATS measurement with the relative error of 5%. The estimated flow velocity was zero. Due to the water stagnation.

Keywords: Remote sensing, Underwater acoustic tomography, Underwater sound speed, Flow temperature, Flow velocity.

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