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A Study of Analysis for Saline Wedge Observation Data

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Abstract

Measurement instruments is very important to capture some phenomena for research. They have been developed as technology advance and are a part of scientific measurement system. It seems that some another part is computer systems. Scientific measurement is one of applications suitable to computers. It will be not developed without computers.

Tokuoka et al. have developed the new saline wedge observation systems which measure salinity, temperature and identified the interface between fresh and salt water by sonic echo. In this work, we study to manage the data from the saline wedge observation system, and we have developed the measurement system through a observation in the Gonokawa River, Shimane Pref., Japan.

Saline wedge invasion in the Gonokawa River was observed over lengthy periods in summer and winter in 1998. Saline wedge behavior was captured precisely using newly developed observation systems. To observe saline wedge phenomena, we made use of an acoustic reflection profiling system, and made measurements six times from a boat. We also used other devices placed on the riverbed, and measured the behavior long term. Here we discuss the observed hydrological data from an hydraulic analysis viewpoint.

About the acoustic reflection profiling system, we adjusted the parameters like a constant of time integration, and improved on post processing. We could capture the saline interface with the acoustic reflection profiling systems which were boat-based instruments and were installed on the riverbed with long term observation. The results were more accurate about salinity changes and reliable for visualize. We managed the temperature data from the optical fiber sensor according to measurement and observation space. We fitted the measurement point on the instrument to observation point using some positioning data with a GPS and resampled the visualized data from raw data. The visualized data of temperature became more correct.

From our data, the length of the saline wedge decreased when the river discharge increased. In other words, the saline wedge moved downstream as the fresh water velocity increased. And The length of the saline wedge was negatively correlated with river discharge.

Key Words: observational system, scientific measurement, acoustic probing, optical fiber, saline wedge