



HIROSHIMA UNIVERSITY

STREAMFLOW RECORDS OBTAINED USING SHALLOW-WATER ACOUSTIC TOMOGRAPHY

Speaker : Dr. Kiyoshi Kawanishi, Professor (Associate)
Date/Time : Friday, 22-March-2019, 09.00 — 11.00
Location : Ruang Sidang S-1 Departemen Teknik Sipil

Summary: Acquiring river discharge estimates is crucial in hydrological studies, extreme event analyses and water resources management. This study investigates the temporal variability in stage–discharge relations from unique high-frequency (every 10 minutes) streamflow time series. The time series data have been obtained using a novel acoustic system, which is called fluvial acoustic tomography (FAT) system, developed by Hiroshima University. In contrast to the traditional point/transect measurements of discharge, the FAT system enables the depth- and range-averaged flow velocity along the ray path to be measured in high temporal resolution. Streamflow measurements were performed in a mountainous gravel-bed river (depth: 0.8 m under low-flow conditions, width: 115 m). Temporal variations in hydraulic parameters of the rating curve (RC: stage-discharge curve) were examined in addition to the variability of RC. The rapid changes of RC occurred owing to flood events. The continuous FATS estimates indicate that the streamflow does not change smoothly with the river stage. Analyses reveal that the streamflow may not be estimated accurately from a smooth rating curve. The relative biases of RC reach $\sim \pm 20\%$ even under higher flow conditions. The FATS captures short-wave irregularities in the streamflow time-series. The following project of FATS system is going to be applied in Bengawan Solo river which has sedimentation problem, aggradation and degradation.



Biography: Dr Kiyoshi Kawanishi is an Associate Professor in the Department of Civil and Environmental Engineering, Graduate School of Engineering, Hiroshima University, Japan. He is a graduate of the Hiroshima University (HU) and was awarded his PhD in Hydraulic Engineering by HU in year 1988. Dr Kawanishi has worked in the fields of fluid mechanics and hydraulic engineering for more than 25 years. Dr Kawanishi founded Research Center for Environmental Technology Transfer in HU in the beginning of year 2011. Recent studies have focused on Innovative hydro-acoustic technology –shallow-water acoustic tomography– and streamflow measurements. Dr Kawanishi took a patent (No.5555904; “acoustic tomography measurement system and method”) on 13 June, 2014. Dr Kawanishi has more than 50 publications in peer-reviewed journals and has secured more than 8,000 million IDR in independent research funding.