World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:10, No:06, 2016

Despiking of Turbulent Flow Data in Gravel Bed Stream

Authors : Ratul Das

Abstract : The present experimental study insights the decontamination of instantaneous velocity fluctuations captured by Acoustic Doppler Velocimeter (ADV) in gravel-bed streams to ascertain near-bed turbulence for low Reynolds number. The interference between incidental and reflected pulses produce spikes in the ADV data especially in the near-bed flow zone and therefore filtering the data are very essential. Nortek’s Vectrino four-receiver ADV probe was used to capture the instantaneous three-dimensional velocity fluctuations over a non-cohesive bed. A spike removal algorithm based on the acceleration threshold method was applied to note the bed roughness and its influence on velocity fluctuations and velocity power spectra in the carrier fluid. The velocity power spectra of despiked signals with a best combination of velocity threshold (VT) and acceleration threshold (AT) are proposed which ascertained velocity power spectra a satisfactory fit with the Kolmogorov “–5/3 scaling-law” in the inertial sub-range. Also, velocity distributions below the roughness crest level fairly follows a third-degree polynomial series.

Keywords : acoustic doppler velocimeter, gravel-bed, spike removal, reynolds shear stress, near-bed turbulence, velocity power spectra
Conference Title : ICBSE 2016 : International Conference on Building Science and Engineering
Conference Location : New York, United States
Conference Dates : June 06-07, 2016