



Exploring particle transport dynamics at a range of flow conditions above threshold

Hamed Farhadi (1) and Manousos Valyrakis (2)

(1) Ferdowsi University of Mashhad, Water science and engineering, Iran, Islamic Republic Of (farhadi.edu@gmail.com), (2) School of Engineering, University of Glasgow, Glasgow, United Kingdom

In this study application of an instrumented (smart-) sphere and particle tracking velocimetry (PTV) techniques have been conducted to monitor and study the behavior of particle motion by capturing the dynamical features of sediment motion. PTV is used as a tracking method to capture the position and velocity of the pebble being transported downstream the flume. The experiments were conducted in the Water Engineering Lab at the University of Glasgow on a tilting recirculating flume with 100×90 cm dimension. Thirteen different discharges have been implemented in the research. A fake bed, made of well-packed beads have been set up in the flume. The particle motion is captured by a high-speed commercial camera, responsible for recording the top view covering the full length of the fake bed over which the particle is allowed to be transported. An instrumented particle of four densities included with an inertial sensor is initially located at the upstream end of the configuration, fully exposed to the free stream flow. Using results from sets of sediment transport experiments with varying flow rates and particle density, the probability distribution functions (PDFs) of particle transport features, such as instantaneous particle velocities, were generated. Using the data from the inertial sensor, the instantaneous particle kinetic energy was measured to discuss about particle and bed energy interaction due to different flow rates. The results of this study could lead to a better understanding of particle motion at above the sediment transport thresholds.