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Density Measurement Device for Water-Sediment Mixtures

Yannick Ratke (1), Timo Fahlenbock (2), and Christian Jokiel (3)

(1) Laboratory of Water and Environment, Cologne University of Applied Science, Cologne, Germany (yannick.ratke@th-koeln.de), (2) Laboratory of Water and Environment, Cologne University of Applied Science, Cologne, Germany (timo.fahlenbock@th-koeln.de), (3) Laboratory of Water and Environment, Cologne University of Applied Science, Cologne, Germany (christian.jokiel@th-koeln.de)

The measurement of water-sediment mixtures plays a crucial role in various fields of hydraulic engineering, such as river monitoring, dredging and waste water treatment. Despite significant technological advances in the field of flow- and sediment-transport surveying, the methods for measuring water-sediment mixtures are limited and of unsatisfactory accuracy due to the large spatial and temporal variability associated with a wide range of physical parameters (grain-size, concentration, flow velocity, gas entrapments).

With the objective to overcome the limitations of existing measurement devices, an innovative device for measuring the density of water-sediment mixtures, without grain-size- and concentration-limitations, has been developed.

The sediment-concentration (in mass percentage) can be calculated by measuring the weight difference of a water-sediment mixture and pure water (by measuring the temperature of the sample) with in a defined volume by the developed device.

The prototype has been tested under laboratory conditions covering a wide range of operating conditions. Within initial field tests the device has proven to be very reliable and robust, providing a comparatively high accuracy of 0.33 g/L, with a duration of 30 seconds per measurement-cycle.

In this paper the design and development of the prototype for the density measurement of a water-sediment mixture is presented that provides a comparatively high measurement accuracy.