

MEASURING HIGH SUSPENDED MATTER LOADS CONCENTRATIONS

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- Suspended sediment
- Concentration
- Environmental metrology
- Fluvial hydrometry
- Water quality
- River pollution
- Sediment transport

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STATE OF THE ART

The traditional gravimetric technique for determination of suspended sediment concentrations (SSC) relies on direct manual collection of samples and is affected by numerous limitations such as not being continuous and dependent on site accessibility, climatic conditions, etc. Presently, there exist many different surrogate methods for determination of SSC such as acoustic backscatter, bulk optic (turbidity), laser diffraction, pressure difference, vibrating tube. However, all those methods suffer from certain limitations.

INVENTION

The Densitometric Probe is an innovative technique for on-line monitoring (semi-continuously or continuously) of the amount of suspended particles in any highly-concentrated open-channel flows. The method relies on a combination of pressure, temperature and water level sensors for collecting environmental variables which are mounted in such an assembly that once processed, their combined signals can be converted into the pursued concentration information. Figure 1 shows the comparison of the signal obtained by the Densitometric Probe and a classical technique.

KEY ADVANTAGES OF THE TECHNOLOGY

- Unique technique to measure high concentrated suspended sediment concentrations (SSC)
- Provides integrative value of SSC for complete water column
- Lower costs

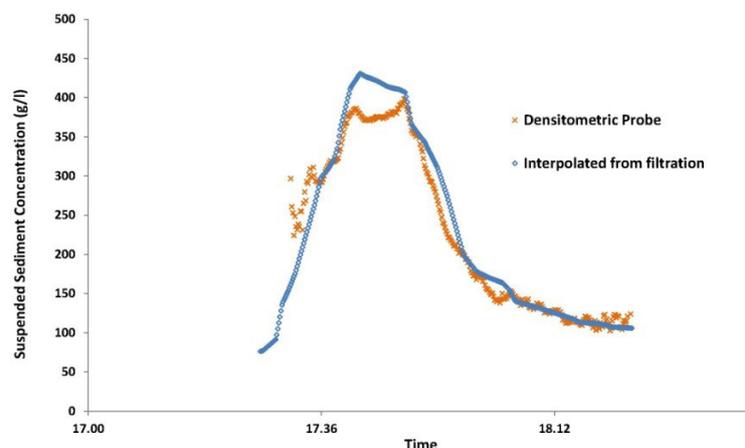


Figure 1. Demonstration that the Densitometric Probe is able to reproduce high SSC during short and intense rainfall events, June 18, 2016, Laval, France.

Suspended sediment concentration	
Measuring range	2g/l - 1300 g/l
Particles size	Rose number <5
Resolution	50 mg/l
Accuracy	0,05%FS
min/max water level	0,2 - 10m
Pressure and Temperature	
Pressure range	0-1.5 bar
Temperature range	-10 - 40°C
Water level	
Measuring range up to	15m
Data communication	
Datalogger	Campbell Scientific CR-6
Sensors assembly power requirement	
Voltage	12 - 32 VDC
Current	max 1.2 A

APPLICATIONS

Knowing quantity of suspended sediments in various open flow channels is crucial for water management. Sediments are one of the most widespread pollutants affecting numerous countries all over the world. A high content of progressive deposition of particles can lead to a hydraulic obstruction or hindering smooth operations of irrigation canals. Management and environmental protection of open channel flows require determining quantitatively the amount of suspended matter loads in water, for example, in some rivers draining areas with severe loamy-soil erosion or irrigation channels where presence of fine particles actually may be beneficial if they serve as fertilizers. In some parts of the world, however, the irrigation channels are so severely loaded in fine suspended particles that it is sometimes a challenge to keep them flowing downslope.

TEAM

The department of Water Pollution Control has a long standing expertise in activated sludge bioprocess (design and operation) and unit operations for particle-liquid separation (such as floatation, centrifugation, high-concentration sedimentation, etc.). The research unit also pursues research in alluvial hydraulics and (suspended) sediment transport modelling, primarily following a data-driven modelling approach, considered to be highly productive in modern environmental assessment and conceptualization efforts.