The Planning and Implementation of Discharge Measurement Sites in Urban Drainage Systems

Dipl.-Ing. Jan Koch & Dipl. Ing. Andreas Wetzstein & Prof. Dr.-Ing. Manfred Ostrowski

--- Example ---

**Aim**
Comparison between measured and calculated excess water

**Selected Site**
Combined Sewer Overflow (CSO)

**Selected Measuring Methods**

- **Hydraulic Method**
  Water level measurement at the weir with ultrasonic level devices to calculate the amount of excess water, (according to different discharge formulas as e.g. “Poleni”).

- **Flow Velocity Method**
  Discharge measurement with two combined sensors (velocity and water level), up- and downstream of the site. Excess Water = Q\text{Upstream} - Q\text{Downstream}

--- In General ---

**Aims of Discharge Measurements in Sewer Networks**
- Evaluation of operating conditions of a sewer network
- Verification of computational simulations
- Survey of overflow structures
- Survey of throttled discharges
- Measuring of excess water

**1. Selection of Suitable Sites**
- Hydraulic criteria
- Access possibilities / operational safety

**2. Selection of Measuring Method**
- Hydraulic methods
- Flow velocity methods

**3. Installation of Measurement Site**
- Installation of devices
- Calibration!
- Setting of intervals for maintenance and readout

**4. Data Evaluation**
- Editing of raw data (velocities and water levels)
- Calculating of discharge
- Plausibility controls
- Interpretation of results

--- Applied Research ---

**State of the Art**
In the majority of cases the calibration of a site while stormwater flow is difficult / expensive.

- Suitable conditions
- Less suitable conditions

Velocity sensors measure in generally within a vertical line the peak velocity. This velocity has to convert to average velocity. According to local boundary conditions this conversion factor varies.

**Oncoming Research Project**
Developing of algorithm to calculate discharges with several linked sensors which are able to determine a velocity profile within a line.

--- Results ---

- Reliable measurements in sewer networks are indispensable for a lot of uses.
- Due to inherent boundary conditions in sewerage networks every site needs adjusted solutions.
- Calibration measurements can be difficult/expensive.
- It exists further Research and Development Requirements.