



Using surface velocity measurements to analyse the influence of the roughness coefficient on river discharge calculations.

Salvador Peña-Haro, Beat Lüthi, and Thomas Philippe
photrack ag, Zürich, Switzerland (pena@photrack.ch)

The Manning-Strickler equation is widely used to estimate the flow velocity in open channels as well as the discharge. One of the parameters of this equation is the Strickler (roughness) coefficient. Despite of its big influence on the velocity and discharge estimations, its value is normally taken from available tables. Furthermore, this value can change over time.

We have installed a system for calculating the river discharge based on the estimation, via image analysis, of the water level and surface velocity. The images are captured using network cameras and then processed to compute the runoff. The runoff is calculated from the estimated water level, surface velocity and from prior knowledge on the channel geometry. The water level is determined by the separation line of image segments with and without optical flow. Via calibration of the camera position this separation line is mapped to a water level. The surface velocity is calculated using a modified method of the standard Particle Image Velocimetry method. Among the key characteristics of the method is the fact that no tracer particles are needed.

Since the system installed measures the velocity, we can calculate the Strickler coefficient. In this work we estimated the uncertainty of this coefficient by comparing the calculated values, and the values reported in tables. We also analyzed the temporal variation of the Strickler over 3 months.