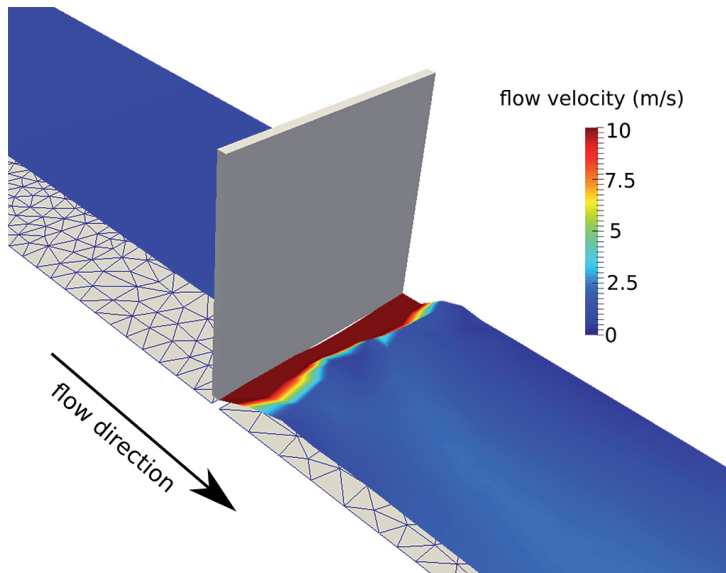# ETH zürich

Numerical modelling of instream hydraulic structures

Simulation of weir flow in depth-averaged model
(Picture: D. Vanzo, VAW)

Hydraulic structures such as weirs or gates may restrict river sediment continuity. Depending on the interaction with the flow field, such structures can trigger aggradation or erosion processes which could reduce the functionality and the stability of the structure itself. Modelling such processes with a numerical tool is not trivial and requires the implementation of robust and effective numerical solutions based on the empirical relations commonly used to design hydraulic structures.

Another challenging task is the modelling the behaviour of culverts and bridges in presence of sediment transport. In case of adverse hydro-morphological conditions (e.g. extreme floods) these structures can switch from open flow to pressurized flow, with sudden and potentially dangerous reduction of both sediment and liquid discharge capacity.

Furthermore, the presence of lateral structures such as groynes or side weirs may also affect the main channel sediment transport hence also such structures require a proper numerical discretization.

In this context we investigate and develop appropriate and robust numerical solutions that ensure sediment continuity when modelling different hydraulic structures.

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