

## Master thesis proposal

**Title:** Investigation of rectangular surface jets

**Institute:** Institute for Hydromechanics

**Supervision:** Prof. Dr. O. Eiff / Dr. Cornelia Lang

**Context and Motivation:** This work is planned in collaboration with the Bundesanstalt für Wasserbau (BAW). To ensure the continuity for upstream fish migration river dams, fish pass facilities (FPF) must be planned and constructed. The hydraulic behavior of the flow in a FPF outlet, submerged in the downstream water of a dam, is characterized by a rectangular surface jet. The goal of this jet is to lure the fish into the FPF. Similar flow situations occur also in other discharge applications such as cooling water or waste water discharge into a river, fresh water in drinking water reservoirs, air jets in ventilation systems, etc. and have as such been the focus of a numerous investigations.

**Planned work:** The work will consist of two parts, scaling and analysis based a background study and an experimental study.

The background study will focus and build on literature results with the following topics and questions:

- 1) Rectangular surface jets emanating into a quiescent fluid.
- 2) Influence of a wall (river bank, river bed) on the jets turbulent and mean structure.
- 3) Influence of a cross flow on the jet.

On the basis of this review, the available data and scaling analyses should be applied to give at least a qualitative estimate and evaluation of the near field flow characteristics of the given fish-pass design and proposals.

In the second part, a hydraulic tank experiment will be set-up for the first flow configuration with the jet emanating into a quiescent fluid. PIV (particle image velocimetry) and or ADV (acoustic Doppler velocimetry) experiments will be performed to describe the near field evolution of the evolving jet, both for the mean flow and the turbulence structure.

Beginning: as soon as possible, no later than 3<sup>st</sup> April 2017

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