

**Master Thesis FS 2019** 



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## Numerical modelling of fish guidance structures

Fish guidance structures (FGSs) with vertical bars are an effective measure to protect and guide downstream migrating fish at medium-to-large run-of-river hydropower plants (Fig. 1). However, such angled bar racks can lead to high hydraulic head losses and asymmetric admission flow. For a sustainable power plant operation, the bar rack design needs to be optimized. At VAW, different rack configurations were tested in a laboratory flume and a new, streamlined bar shape was developed to improve the hydraulic performance of FGSs. The results showed that the flow conditions around the racks strongly depend on geometrical parameters such as rack angle, bar angle and bar spacing. Due to geometrical constraints, however, the flow conditions in the close vicinity of the rack and between the single bars could not be measured in the laboratory flume.



Fig. 1: Downstream fish migration concept and flow pattern between two bars of a FGS (Tsikata, 2014)

In this master thesis, a 3D numerical model of the angled bar racks is set up. Different rack configurations with varying rack angles, bar angles and bar spacings are investigated to model the flow conditions in the close vicinity of the racks. The results will be compared with the findings of the laboratory study and recommendations for prototype applications will be given. The candidate should have an interest in fluid dynamics. Experience with numerical modeling are an asset.

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Remarks:	Single Master Thesis
	Experience with numerical modelling is beneficial
	Project language English or German