FISHVIEW

Publishable Summary of the 1st Year Periodic Report

Summary

The objective of the FishView project is to improve the design of fishpasses on rivers. and understand how fish perceive and respond to various hydrodynamic environments. For that we have developed a unique sensing system; a fish-shaped probe that mimics the fish lateral line (fishes flow sensitive organ). This probe is used to understand how fish perceive flow, specifically various hydrodynamic conditions in fish passes.

During the first year we have developed the new sensor, tested it in laboratory conditions and in the field in natural flows. The device is a fish shaped probe, equipped with 16 pressure-sensitive sensors arranged in a line on both sides of the probe, in the nose and on the top. First, the sensor was calibrated and tested in laboratory conditions where we can precisely control the flow (e.g. speed or the angle of the probe with respect to flow). Then we have tested the sensor in more complicated environments, such a fishpasses in a laboratory and in natural flows in rivers.

From the sensor signals of the probe we have worked out methods how to estimate the flow speed and flow direction from the sensor signals. By recording the lateral line signals we can now say how strong is the flow and in which direction it flows. We can record ore complicated signals, for example in the wakes of objects in rivers. From the sensor signals we can identify and classify specific locations with rather high accuracy by just looking at the sensor signals.

Also, we have used those signals to develop computer models of flows in fishpasses. Those computer models will in the future let us change flow parameters to understand how fishpasses function under many different flow conditions, and simulate a collection of fishpass designs before actually physically building them.

For the next year of the project we will focus on collecting more data from various test sites, further developing our flow signal analysis methods and for improving our computer models.

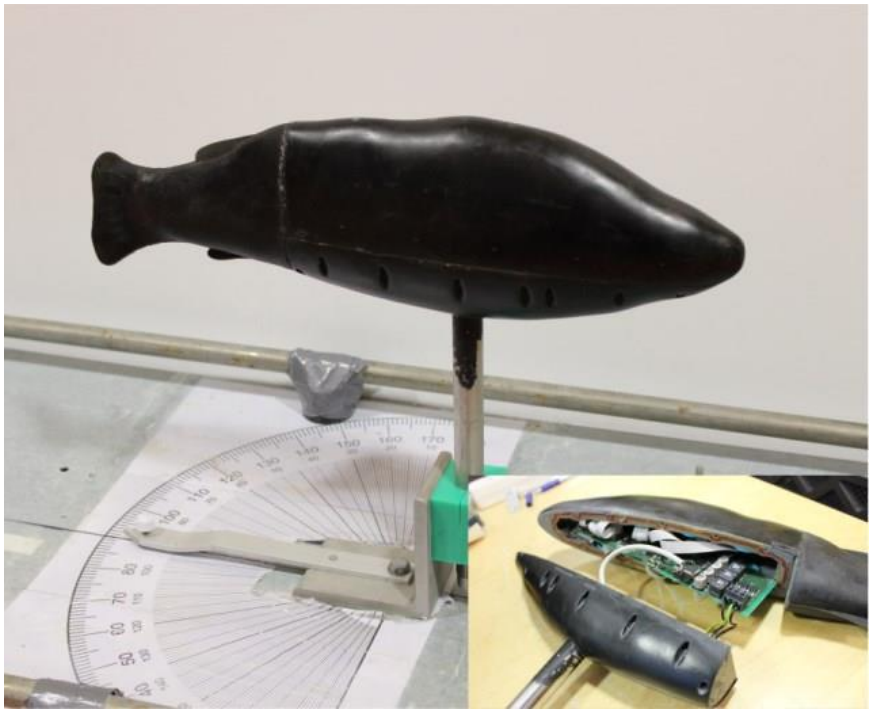

Fig.1. A lateral line probe developed in FishView is attached to a force measurement device for calibration.

Fig. 2. Testing an artificial lateral line probe in natural flows.

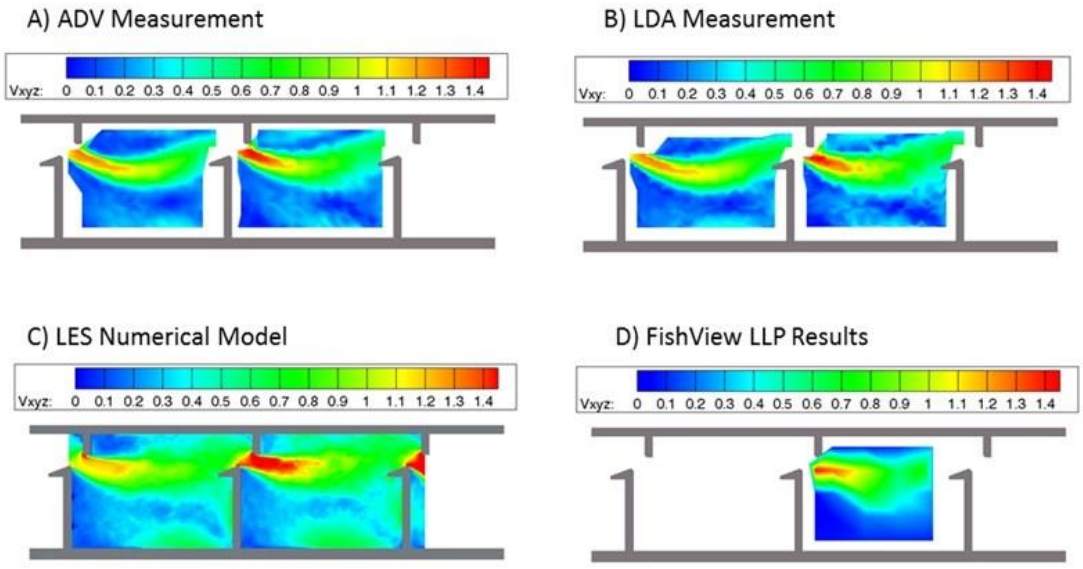

Fig. 2. Comparison of current velocity estimates between A) Acoustic Doppler Velocimetry, B) Laser Doppler Velocimetry, C) Large Eddy Simulation 3D model, and D) our Fishview Lateral Line Probe. The simulation shows that our probe accurately estimates the real flow conditions in fishpasses.