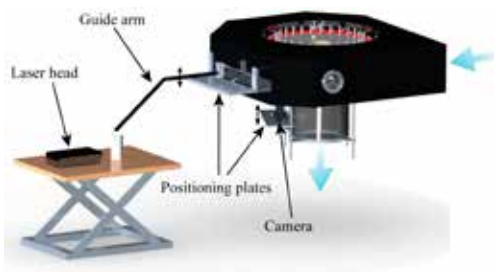
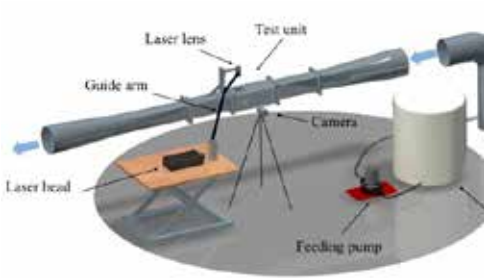
Background

Vortex shedding is a dominant feature occurring for almost any bluff geometry exposed for fluid flow. In a hydropower context, this phenomenon has been found to generate high frequency fatigue damage and noise, potentially causing structural failures in components such as turbine runners.

Vortex shedding from a hydrofoil





The figures presents the PIV-setups to be utilised for the Francis turbine (above) and hydrofoil investigations (right).

Objective

In this work, the main objective is to investigate the vortex shedding phenomenon using particle image velocimetry (PIV) on two experimental setups. Measurements will be performed in the downstream region of a hydrofoil resembling a typical Francis runner blade, and in the vaneless space of a Francis turbine. Simultaneous measurements of structural vibrations will be performed to analyse the fluid-structure interaction (FSI) in the corresponding setups. The experimental data will be used as a comparative basis for simulations, and to evaluate if the undesired effects of vortex shedding may be mitigated by means of alternative structural designs.

MASTER THESIS

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Experimental investigation and mitigation of vortex shedding

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