

Background

Local patches of high and low energy exists, but the mix of energy is better further away from the turbine. The energy consists of velocity and temperature. This non-homogenous mixture can result in errors when doing thermodynamic efficiency measurements. When doing thermodynamic efficiency measurements IEC 60041:1991 is used as a standard. IEC 41 specifies that for measuring sections with free surface a distance of 4 to 10 runner diameters is found to be satisfactory for Pelton turbines.



Entrance to Ylja power plant

The objective of this thesis is to see how the energy in a cross section changes with distance from the turbine. If it is possible to do energy measurements closer to the turbine than what the IEC 41 recommends. Field measurements shall be done in the outlet of Ylja power plant (Eidsiva). Temperature measurements will be done with a frame that can be moved up/down and back/forth. Propeller current measurements are to be taken simultaneously. Data from the measurements will be analyzed with respect to flow, temperature and error analysis for thermodynamic efficiency measurements.



From project thesis: Propeller current measurements in the free surface loop at the Water power Laboratory at NTNU.

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Energy measurements
in the field

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