

Abstract
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Flow Computation and Quantitative Analysis of Pelton Distributors

In the field of Pelton turbines, the understanding of the physics of the flow and the sources of loss requires extensive investigations that rely on both experimental and numerical developments. The main reason for this is that the flow patterns and the hydraulic losses are very difficult to observe and quantify separately. Indeed, the Pelton turbine efficiency comes from jet quality which is directly defined from the distributor geometry, possibly the upstream penstock geometry and the site head. By giving access to any time and spatial dependant flow variable inside the Pelton distributor, CFD computations help us to well understand small length scale internal flow phenomena that have to be related to general flow behavior.

Thanks to new accurate capabilities and features that have been developed in OpenFOAM, simulations of Pelton distributor have been carried out and validated on both experimental and compared with other numerical codes. These validated computations can then be integrated inside any process.

Besides, due to the need of more and more accurate simulations analysis, i.e. especially the need to have access no more to qualitative analysis but also to quantitative analysis, new Paraview modules or filters have been developed with the collaboration of the Swiss National Supercomputing Center (CSCS). These new developments are able, for example, to give accurate variable values (such as total pressure) integrated on any analysis section that cut the computation domain and this, using either the GUI ParaView mode or the ParaView batch mode.

The Pelton distributor analysis process will be presented based on OpenFOAM simulations and ParaView post-processing.