Unsteady Flow Computation of a Pump Turbine

Michael Buchmayr, michael.buchmayr@andritz.com	ASTROE GmbH A-8010, Graz, Austria
Florent Champet, florent.champet@andritz.com	ANDRITZ HYDRO CH-Vevey, Switzerland
Dr. Arno Gehrer, arno.gehrer@andritz.com	ASTROE GmbH A-8010, Graz, Austria
Dr. Etienne Parkinson, etienne.parkinson@andritz.com	ANDRITZ HYDRO CH-Vevey, Switzerland

Abstract

Pump turbines are commonly used in reservoir water power plants. Their main aim is to provide electricity during times of high demand, and to store water in reservoirs when the demand is low. Indeed, that fact that pump-turbines are run in both, pump- and turbine modes, makes it very challenging to design them. To understand the complex physics of the flow in such machines it is crucial to carry out accurate numerical simulations as well as experiments.

This paper compares the numerical CFD code OpenFOAM with a commercial CFD program, studying the unsteady flow in a pump turbine. The model used is a turbulent k-omega approach using wall functions and GGI at the mesh interfaces. The machine's efficiency is obtained using integral performance data. Additionally time histories of pressure data probes will be compared to experimental data probes.

Key words: Pump turbine, GGI, unsteady computation, experimental comparison, turbulence, rotor-stator

References

[1] M.Buchmayr, F.Champet, A.Gehrer, E.Parkinson : Unsteady Flow Computation of a Pump Turbine, 5th OpenFOAM Workshop, Chalmers, Gothenburg, Sweden, June 21-24, 2010