Modelling the two-dimensional swirling flow in francis turbines for optimization of draft tube performances within an operating range. part I: two-dimensional steady axi-symmetric swirling flow computation downstream the francis runner

Goal of the project:
It is developed a new methodology for two-dimensional axi-symmetric swirling flow computation downstream the Francis runners in order to optimize the draft tube performances within an oprating range.

Short description of the project:
The investigation in the current project is focused on developing a computer code for evaluating the swirling flow downstream the Francis runners. Such that we accommodate an inlet section as close as possible to the blade trailing edge, while extending the computational domain in the discharge cone.

Project implemented by:
ALSTOM HYDRO FRANCE and „Politehnica "University of Timisoara – National Centre for Engineering of Systems with Complex Fluids and Hydraulic Machinery Department

Implementation period:
September 2012- March 2013

Main activities:
Analysis of the 2D swirling flow downstream a Francis runner within the discharge cone.

Development of a 2D swirling flow code and code validation within a large operating range.

Results:
Susan-Resiga R.F., Muntean S., Ciocan T., Joubarne E., Leroy P., Bornard L., *Influence of the velocity field at the inlet of a Francis turbine draft tube on performance over an operating range*, IoP Conf. Series: Earth and Environ. Science,15.03.2008. (http://iopscience.iop.org/1755-3/032008)

Fields of interest:
Optimization in Hydro Turbines

Financed through/by:
ALSTOM HYDRO FRANCE

Research team:
Prof. Dr. Eng. Susan-Resiga Romeo, Dr. Eng. Muntean Sebastian - CS I, Dr. Eng. Anton Alin Adrian, Eng. Ciocan Tiberiu PhD student, Eng. Ighişan Cosmin PhD student

Research centre:
Research Centre for Complex Fluid Systems Engineering

Aplicability and transferability of the results:
The new methodology will be applied in the early design stage of the Francis runners in order to extend the operating range as well as to improve the energy bahviour.

Contact information:
E-mail: resiga@mh.mec.upt.ro