S5 - Hydraulic Machines and Systems

Organizers: Eduard Doujak, Shuhong Liu, & Shouichiro Iio

Hydropower is one of the most important renewable energy sources to produce green electricity. Turbines, pump turbines and storage pumps are the backbone of every hydraulic system and perform an enormous task every day to support our daily lives. Hydraulic machines satisfy local requirements worldwide. The rapid growth of knowledge and the fact that know-how can be found all over the world makes research in this field unique. Local requirements shape local research and development. In consequence, the issues scientifically investigated in Europe can differ from the ones studied in America (USA and Canada) or China for example. General topics such as Pumped Storage or the lifetime of components are studied by universities worldwide. But specific, regional research topics broaden the horizons of each participant, as does the exchange of ideas on these general, global topics.

In addition, hydropower is now facing new challenges in terms of flexibility and operating range extension due to the increasing integration of intermittent, renewable energy sources, such as wind and solar, into the electrical network.

Therefore, the exchange of knowledge and experience in renowned conferences, as ISROMAC, is important, as it enables an exceptional network of worldwide activities. Scientists and engineers from universities and industrial companies worldwide are invited to participate in the **Hydraulic Machines and Systems** session of ISROMAC 18 to share their knowledge, new insights and new developments.

Non-exhaustive list of suggested topics

- Novel design and optimization methodologies
- CFD studies of the internal flows, with emphasis on turbulent unsteady flow fields
- Flow-structure interaction and rotor dynamics
- Experimental techniques in hydraulic machinery
- Pressure fluctuations, noise and vibrations in hydraulic machinery
- Cavitation and multi-phase flows in hydraulic machinery
- Flow instability, vortex rope, vortex shedding
- Plant operation, System control
- Modeling of water hammer or surge in hydraulic systems
- Coupling of 1D and 3D CFD simulation of hydraulic systems
- Modeling and evaluation of transient CFD simulations

Organizers

Dr. Eduard Doujak graduated in mechanical engineering from the TU Wien and works since 1995 as an Assistance Professor at the TU Wien / Institute for Energy Systems and Thermodynamics in Austria. His major research fields are multistage pumped turbine sets for small hydro applications, refurbishment of old plants and the investigation of the impact of off-design operations on the runner residual lifetime.

Prof. Shuhong Liu is working as a Professor at Tsinghua University (Beijing, China), teaching Applied Fluid Mechanics. Her major is Fluid Machinery and Fluid Engineering. Research objects include hydraulic turbines, pump-turbines, pumps, hydraulic couplings, blood pumps, focusing on complex internal flows, i.e., cavitation, multiphase flows, and flow instabilities.

Prof. Shouichiro Iio graduated in mechanical engineering from Miyazaki University, Japan. He worked from 2004 to 2011 as an Assistant Professor and is an Associate Professor since 2011 at Shinshu University/ Fluid Control Laboratory in the Department of Mechanical Systems Engineering. His primary research fields are Small Hydro Turbines, Water Hydraulic Components and Cavitation.

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