



IAHR Technical Committee on Hydraulic Machinery and Systems 2009 Activity Report

A. Division I: IAHR Hydraulics

Technical Committee on Hydraulic Machinery and Systems

Reporting Period: 2008-2009

B. Mission statement / Long range objective

The IAHR Committee on Hydraulic Machinery and Systems deals with the advancement of technology associated with the understanding of steady and unsteady flow characteristics in hydraulic machinery and conduit systems connected to the machinery. The technology elements include the fluid behavior within machine components, hydro-elastic behavior of machine components, cavitation, and two phase flow in turbines and pumps, hydraulic machine and plant control systems, the use of hydraulic machines to improve water quality, and even considerations to improve fish survival in their passage through hydro plants. Included in two phase pumping are gas oil pumps and sand laden water. Because model tests and laboratory tests carried out in laboratories must be scaled down from the prototypes, studies of size and pressure scale effects are also a central research field. The research work in the Committee forms the basic study for the IEC standards code dealing with hydraulic machinery for hydroelectric power plants.

The main emphases of the IAHR Committee on Hydraulic Machinery and Systems are to stimulate research and understanding of the technologies associated with hydraulic machinery and to promote interaction between the machine designers, machine users, the academic community, and the community at large. Hydraulic machinery is both cost effective and environmentally responsible. The increasing atmospheric content of carbon dioxide related to pollution from thermal power plants, is one of the most significant threats to our global ecology. The problem is exacerbated by the need for increased energy production in third world countries. This results in rising global temperatures and dramatic changes in climate which may also result in flooding in parts of our globe. Energy conservation together with replacement of coal and oil-fired power plants are, therefore, needed. The development and installation of more efficient hydroelectric power plants which work hand in hand with water storage and flood protection is part of this strategy. Waterpower is the most significant “renewable resource”. The goals of this IAHR Committee are to improve the value of hydraulic machinery to the end user and to society and to improve society’s understanding and appreciation of that value.

To meet its objectives, the Committee focuses on the best possible exchange of technical knowledge through collegial contacts by arranging Committee Symposia every second year, between the IAHR Congresses. The Symposia are designed to attract

scientists and engineers from industry, universities, consultants and users of hydraulic machinery. In addition, specialized meetings are organized focusing on the subjects of the Working group on Cavitation and Dynamic problems on hydraulic machinery and systems.

The Committee on Hydraulic Machinery and Systems will stimulate the following activities through symposia and working group meetings:

- The production of “environmentally friendly” turbines with higher efficiencies, wider operating ranges, smoother operating characteristics, and increased life-spans for new hydropower installations.
- The upgrading, uprating, and life extension of existing hydropower facilities.
- The production of inexpensive small hydro.
- The production of large pumping systems for transport of water for drinking and irrigation, for cooling in thermal power plants and for pumped-storage applications.
- The production of improved digital systems for cost effective and environmentally effective plant operation, maintenance, and energy recovery.

C. Committee Membership

Number of committee membership:

In average there are about 200 attendees at the biennial symposium of the Committee and about 100 attendees at the working group meeting held alternatively. Therefore, we can estimate the number of IAHR members of the committee to about 300 people.

Leadership Team:

Prof. François AVELLAN, EPFL École Polytechnique Fédérale de Lausanne, Switzerland, francois.avellan@epfl.ch, Chair;

Prof. Eduardo EGUSQUIZA, UPC Barcelona, Spain, egusquiza@mf.upc.es, Vice-Chair;

Dr. Richard K. FISHER, VOITH Hydro Inc., USA, richard.fisher@voith.com, Past-Chair;

Mr. Fidel ARZOLA, EDELCA, Venezuela, farzola@edelca.com.ve;

Dr. Michel COUSTON, ALSTOM Hydro, France, michel.couston@power.alstom.com;

Dr. Niklas DAHLBÄCK, VATENFALL, Sweden, niklas.dahlback@vattenfall.se;

Mr. Normand DESY, ANDRITZ Hydro Ltd., Canada, normand.desy@andritz.com;

Dr. Andrej LIPEJ, TURBOINSTITUT, Slovenija, andrej.lipej@turboinstitut.si;

Prof. Torbjørn NIELSEN, Norwegian University of Science and Technology, Norway, torbjorn.nielsen@ntnu.no;

Prof. Romeo SUSAN-RESIGA, “Politehnica” University Timisoara, Romania, resiga@mh.mec.utt.ro;

Mr. Qing-Hua SHI, Dong Feng Electrical Machinery, P.R. China, qhshi@dfem.com.cn;

Prof. Geraldo TIAGO F^o, Universidade Federal de Itajubá, Brazil, tiago@unifei.edu.br;

Prof. Hiroshi TSUKAMOTO, Kyushu Institute of Technology, Japan, tsukamoto@life.kyutech.ac.jp.

Working Group on Cavitation and Dynamic problems on hydraulic machinery and systems

Dr. Albert RUPRECHT, Stuttgart University, Germany, ruprecht@ihs.uni-stuttgart.de.

D. Affiliation with other professional associations

Affiliation with international programmes

E. Report on activities in reporting period

Committee meetings

The 24th symposium was held October 27-31, 2008 in Foz do Iguaçu, Brazil where 250 people were attending, see the minutes of the Leadership Team meeting hereafter attached.

Specialty conferences

NA

(continuing) education activities

NA

Working Group meetings and output

The working group meeting was held October 14-16, 2009 at Brno University, Czech Republic. The meeting was a success with 120 attendees.

Publications: proceedings; papers for IAHR Journals; state-of-the-art papers; monographs; books.

Proceedings of the 24th IAHR Symposium on Hydraulic Machinery and Systems October 27-31 2008, Foz do Iguaçu, Brazil.

Special Issue of selected papers of the 24th IAHR Symposium, International Journal on Fluid Machinery and Systems, Vol. 2 No. 4, October December 2009.

<http://www.jstage.jst.go.jp/browse/ijfms>

Proceedings of the 3rd IAHR International Meeting of the Working Group on Cavitation and Dynamic Problems in Hydraulic Machinery and Systems, October 14-16, 2009, Brno, Czech Republic.

Contacts with other organizations

Agreement with the Turbomachinery Society of Japan, Korean Fluid Machinery Association, Chinese Society of Engineering Thermophysics for publishing in the online Journal of Fluid Machinery and Systems.

Contact with IEC TC 4 for the revision of standards for hydraulic machines.

Other activities

Trip to Tsinghua University for discussing with the faculty colleagues of the State Key Laboratory of Hydrosience and Engineering the opportunity to hold the 26th IAHR Symposium on Hydraulic Machinery in Beijing tentatively October 8-12, 2012.

F. Short range plans (1 to 2 years)

The 25th IAHR Symposium on Hydraulic Machinery will be held September 20-24, 2010 at Timisoara, Romania.

The 4th IAHR International Meeting of the Working Group on Cavitation and Dynamic Problems in Hydraulic Machinery and Systems will be held in 2011 in Belgrade, Serbia.

The 26th IAHR Symposium on Hydraulic Machinery will be held in 2012 in Beijing, P. R. of China.

Lausanne, June 27, 2010

IAHR Technical Committee on Hydraulic
Machinery and Systems

Professor F. Avellan, Dr. Eng.
Chair