Vice Presidency for Research
Research Centers
Technology Platform for Hydraulic Machines

Hydraulic Machinery Engineering 2024 Short Course

Date: September 2 to September 6, 2024

Organized by EPFL

To be held at the EPFL Technology Platform for Hydraulic Machines
Avenue de Cour 33 Bis, 1007 Lausanne, Switzerland

École polytechnique fédérale de Lausanne

EPFL PTMH
Avenue de Cour 33 Bis
1007 Lausanne
Switzerland

Telephone: +41 21 693-54 56
info.ptmh@epfl.ch
Web : ptmh.epfl.ch
Location : Map-Plan classroom PTMH

PROGRAM

Hydraulic turbomachines:
- Fundamentals;
- Hydrodynamics - Similitude – Cavitation.

Hydraulic turbomachinery engineering:
- Francis turbine runner;
- Pelton turbines;
- Centrifugal pumps.

Hydraulic turbomachines flow numerical simulations:
- Current and future tools;
- Industrial practice.

Model and Field Testing
- Reduced scale physical model instrumentation;
- Acceptance tests and specific tests;
- Hydroelectric power plant visit.

Operation Challenges
- Electricity market;
- Power system stability;
- Pumped storage power plants.

CONDITIONS

Short course:
- Duration: 40 hours, 16 lecture modules, 1 site visit, 5 days;
- Prerequisite: Degree in engineering or professional engineering experience in industry;
- Language: English
- Certificate of attendance: at the end of the Short Course.

The course session will be held week 36 if a minimum of 12 attendees are registered.

Registration
- Online at www.epfl.ch/labs/lmh/formation-continue/;
- By completing the attached form to be addressed to EPFL-PTMH attention to
  Mrs Nadia Kaiser, Avenue de Cour 33 Bis, 1007 Lausanne/Switzerland,
  E-mail: nadia.kaiser@epfl.ch, Tel.: +41 21 693 54 56.

Fees (VAT 8.1% not included)
- CHF 3'500.00* (per person, including technical documentation, technical visit, lunch and coffee break).
- CHF 3'000.00* for the second attendee of the same company or institute;
- **Cancellation fees*: 10% of the amount will be charged.
- Payment in advance by bank or postal transfer in Swiss Franc (CHF) to
  Swiss Post, Postfinance SA, Mingerstrasse 20, 3030 Bern-Switzerland
  Swift/Bic POFICHBEXXX, Account no: 17-714571-6, IBAN for Swiss Francs: CH2709000000177145716
  Reference: CC 0332 - Funds 111564 + invoice no. to be mentioned
- to be transferred before August 10.

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Hydraulic Machinery Engineering
2024 Short Course
Time Schedule

Week 36	Monday 02.09.2024	Tuesday 03.09.2024	Wednesday 04.09.2024	Thursday 05.09.2024	Friday 06.09.2024
07:30				**Departure Visits**	
08:00 08:15	**Participants welcome**				
08:30	**Introduction to Hydraulic Turbomachines** F. AVELLAN EPFL PTMH	**Pelton Turbine Engineering**	**Hydraulic Turbine Engineering Design**		**CFD in Hydraulic Machines**
09:15					
09:15	**Cavitation** M. FARHAT EPFL STI SCI MF	N. GERVAIS ANDRITZ HYDRO	Y. LAURANT GE HYDRO FR	**Bieudron Power Plant**	S. LEGUIZAMON GE HYDRO FR
10:15					
10:15 10:45	**Coffee Break** (30 min)	**Coffee Break** (30 min)	**Coffee Break** (30 min)		**Coffee Break** (30 min)
	Cavitation in Hydraulic Machines A. JUNG VOITH HYDRO	**Hydro Energy Market** M. MURET CITY WORKS OF LAUSANNE	**Dynamic Phenomena** F. DUPARCHY GE HYDRO FR		**Fluid-Structure Interaction in Hydraulic Machines** M. FAHRAT & PhD Students EPFL SCI STI MF
12:45 13:30	**Lunch** (45 min)	**Lunch** (45 min)	**Lunch** (45 min)		**Lunch** (45 min)
13:30	**Model Testing & On Site Measurements** M. SUAREZ EPFL PTMH	**Pump Design & Selection Criteria** S. BERTEN SULZER PUMPS	**Transient Phenomena In Hydroelectric Power Plant** C. NICOLET POWER VISION	**Grande Dixence Dam** 	**Conclusion** End of the Short Course
15:00					
15:00	Break (30 min)	Break (30 min)	Break (30 min)		
15:30	**Model Tests and Cavitation Tunnel Demonstrations** EPFL PTMH EPFL SCI STI MF	**R&D with Numerical Simulations for Hydraulic Machines** C.MÜNCH & colleagues (HES-SO)	**The role of variable speed pumped storage in electric power systems** C. MOREIRA INESCTEC		
17:15					
17:15	**Welcome Party**				
19:00				**Dinner**	

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Short Course on
Hydraulic Machinery Engineering

September 2 to 6, 2024

1. **HYDRAULIC TURBOMACHINES**
   Prof. F. AVELLAN, EPFL-PTMH, Switzerland

2. **CAVITATION**
   Dr. M. FARHAT, EPFL-SCI-STI-MF, Switzerland

3. **CAVITATION IN HYDRAULIC MACHINES**
   Dr. A. JUNG, VOITH HYDRO, Germany

4. **MODEL TESTING & ON SITE MEASUREMENTS**
   Ing. M. SUAREZ, EPFL-PTMH, Switzerland

5. **PELTON TURBINES ENGINEERING**
   Ing. N. GERVAIS, ANDRITZ HYDRO, Switzerland

6. **HYDRO ENERGY MARKET**
   Ing. M. MURET, SIL, Switzerland

7. **PUMP DESIGN AND SELECTION CRITERIA**
   Dr. S. BERTEN, SULZER PUMPS (HQ), Switzerland

8. **NUMERICAL SIMULATION RESEARCH ACTIVITIES**
   Dr. C. MÜNCH and Dr. S. ALIMIRZAZADEH, D. BINER, J. DECAIX, Dr. O. PACOT, HES-SO Valais-Wallis, Switzerland

9. **HYDRAULIC TURBINE ENGINEERING DESIGN**
   Dr. Ing. Y. LAURANT, GE HYDRO, France

10. **DYNAMIC PHENOMENA**
    Ing. F. DUPARCHY, GE HYDRO, France

11. **SIMULATION OF TRANSIENT PHENOMENA IN HYDROELECTRIC POWER PLANTS**
    Dr. Ch. NICOLET, POWER VISION, Switzerland

12. **THE ROLE OF VARIABLE SPEED PUMPED STORAGE IN ELECTRIC POWER SYSTEMS**
    Prof. C. MOREIRA, INESC TEC, Portugal

13. **CFD IN HYDRAULIC MACHINES**
    Ing. S.LEGUIZAMON, GE HYDRO, France

14. **FLUID-STRUCTURE INTERACTION IN HYDRAULIC MACHINES**
    Dr. M. FARHAT and Doctoral Students, EPFL-STI-SCI-MF, Switzerland