

TECHNICAL DESCRIPTION & CHARACTERISTICS OF HYDROPHIL

Our *HydroPHIL* platform replicates your hydroelectric unit, including its hydraulic design, mechanical inertia, actuator performance, electrical machine topology, power electronics, automation and instrumentation.

Reduced-scale model

- 4 quadrants pump-turbine
- Customisable hydraulic design
- Ability to replicate projects from 50 m to 900 m
- Real-time operating ring
- Turbine outlet up to ~20 cm diameter

Control

- OPAL OP4510 Real Time Controller
- MATLAB/Simulink interface
- Ability to connect and test any black boxed industrial controller

Grid emulation

- 15 kVA bidirectional conversion mock-up
- 400 VAC grid, with harmonics up to 40 kHz

Hydraulic circuit emulation

- Emulated water hammer with up to 16 mWC net head, 120 L/s

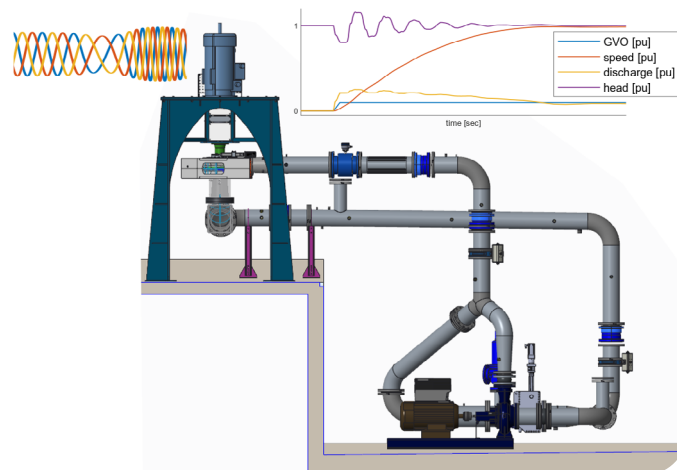
Homology with respect to time constants

- Hydraulic inertia & dynamics (wicket gate closes <1s)
- Mechanical inertia
- Electrical time constants
- Actuator's performances

SPECIFIC TEST CONFIGURATION

- Dynamic performance & safety characterisation
 - Wicket gate control: speed & power regulation
 - Transient behaviour: overspeed, start-up, turbine rewatering, water column separation, etc.
 - Grid compliance: fault ride-through, active & reactive power, ancillary services etc.
 - Variable speed control
 - Hybridisation
 - Safety checks using fault injection
- 4 quadrants hydraulic characterisation
- Training tailored to your specific needs

VARIABLE SPEED & BATTERY HYBRIDISATION



We can simulate a wide range of power conversion system layouts, including: conventional fixed speed units, DFIM variable speed, fully FED variable speed and other topologies such as Hybridised Hydro Power Plants.

FLUID DYNAMICS



We support fluid dynamics research by reproducing multiphase flows with phase changes under unsteady conditions (e.g., load rejection, rapid flow variations, or mode transitions).

**Contact our team
to find out how we
can work together!**

