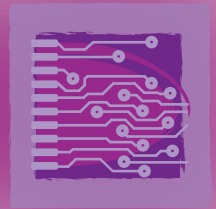




© Stock exchange



HYDRALAB III: Integrating European Hydraulic Research Infrastructure

Water is one of the basic essentials of life. Without it, Earth would be a dead planet. Thus, informed management and use of water resources is essential to human well-being and the environment, as well as being a prerequisite to the development of advanced technologies. Hydraulic research is developing more and more beyond traditional civil engineering to meet increasing demands in environmental studies and assessment of natural hazards like flooding and coastal erosion. As it expands towards oceanic and atmospheric flow studies, sediment transport, bio-geochemical processes, and even sociology and management sciences, the interaction between experimental physical-model research, theoretical analysis, numerical model research and field tests becomes more important. In a bid to improve the use of high-quality experimental facilities, the HYDRALAB network of 20 participants, hosting 22 unique large hydraulic research facilities at 9 European institutes, has launched an EU-funded Integrated Infrastructure Initiative focusing on hydraulics, geophysical hydrodynamics, environmental fluid dynamics, ship dynamics and ice engineering.

● LIFE-SIZE EXPERIMENTS

Thanks to a coordinated programme of Transnational Access, Joint Research Activities and Networking Activities, HYDRALAB III is striving to improve the performance and interaction of experimental facilities in Europe and working towards the long-term integration of different types of installations, with the ultimate aim of setting up a series of virtual European Laboratories. This general interface between theory and experiment is a useful contribution to the structuring of the European Research Area in the field of hydraulics.

In the past, hydraulic studies were undertaken mostly with physical models, reproducing flow phenomena at reduced scale with dynamical similarity. But nowadays, the end results appear more and more in the form of numerical models, which provide detailed predictions, in a cheaper, more versatile and attractive way, but they still need to be tested in labs under well-defined circumstances to ensure they are representative of complex turbulent processes and boundary conditions. Large-scale facilities are in particular needed to approach the multi-scale interactions of natural flow phenomena without distorting them too much.

Experiments in hydraulics are fundamental for creating the necessary tools for predictions of such important phenomena as flooding, coastal inundation, impact on water quality in rivers, estuaries, coastal and marine areas, exploitation of ocean-based



resources, ship design and ice engineering. New goals need to be set to balance experimental physical-model research with other research tools like theoretical analysis, numerical-model research and field tests, while researchers need to map out the desired direction of development at a European level, as a vision for the next five to ten years. Meanwhile, laboratory experiments are likely to be as essential in 20 years' time as they are today. On a Europe-wide scale, they supply the new process information that feeds into numerical models, and educate engineers and researchers in the processes they need to understand.

● TAPPING LARGE HYDRAULIC FACILITIES

The biggest contribution to research infrastructures that HYDRALAB III has to offer lies in its unique experimental facilities for fundamental and applied research, some of which have been opened up for access during previous EU Framework Programmes, as far back as FP2. Just like academic computing centres and networks, use of these facilities is very costly and public funding essential.

Nine HYDRALAB participants are offering complementary Transnational Access to 22 experimental facilities throughout Europe that would otherwise not be available for certain groups of hydraulic researchers. Among these are Deltares in the Netherlands, DHI in Denmark and the Universities of Catalunya and Hannover with their vast wave facilities (including a 240-metre-long delta flume for testing regular and irregular waves of up to 2.5 metres high); CEHIPAR in Spain, with its 75 years' experience, calm water towing tank, cavitation tunnel and ship dynamics laboratory; and the world's biggest turntable at the Laboratoire des Ecoulements Geophysiques et Industriels (LEGI) in Grenoble,

France, which was built in 1960 for modelling tidal currents in the English Channel, and later renovated and instrumented to study the dynamics of rotating fluids. Furthermore, the University of Hull and the Norwegian University of Science and Technology offer access to environmental hydraulics facilities and the Hamburg Ship Model Basin, providing the opportunity to conduct research in ice engineering.

The HYDRALAB III participants are also involved in networking activities, such as infrastructure community meetings, workshops, stakeholder dissemination meetings to share know-how with the wider hydraulic research community and keeping an updated Internet site. The Initiative also focuses specifically on the involvement of women and young researchers. Infrastructure performance is further being enhanced by HYDRALAB III's two mutually focused Joint Research Activities on improving methods of modelling the interactions between beaches and structures by developing composite modelling techniques and innovating instruments and good-practice protocols for mobile bed tests.

● INTEGRATED INFRASTRUCTURE INITIATIVE HYDRALAB III IN SUMMARY

Project acronym: HYDRALAB III

Funding scheme (FP6): Integrated Infrastructure Initiative (I3)

EU financial contribution: €11.8 million

EU project officer: Brigitte Weiss

Duration: 48 months

Start date: 1 April 2006

Completion date: 31 March 2010

Project webpage: www.hydralab.eu

Coordinator: Simone van Schijndel, Stichting Deltares, Hydralab@deltares.nl

Partners: Stichting Deltares (NL), Canal de Experiencias

Hidrodynamicas del Pardo (ES), Centre National de la Recherche Scientifique (FR), DHI Water & Environment (DK), Danmarks Tekniske Universitet (DK), École Polytechnique Fédérale de Lausanne (CH), HR Wallingford Ltd (UK), Hamburgische Schiffbau – Versuchsanstalt (DE), University of Hull (UK), LNEC (PT), Centre National de Recherches Meteorologiques (FR), Norwegian University of Science and Technology (NO), Natural Environment Research Council (UK), SAMUI (UK), Università degli studi di Catania (IT), Universität Hannover (DE), Universitat Politècnica de Catalunya (ES), University of Twente (NL), Universiteit Utrecht (NL), VITUKI (HU)