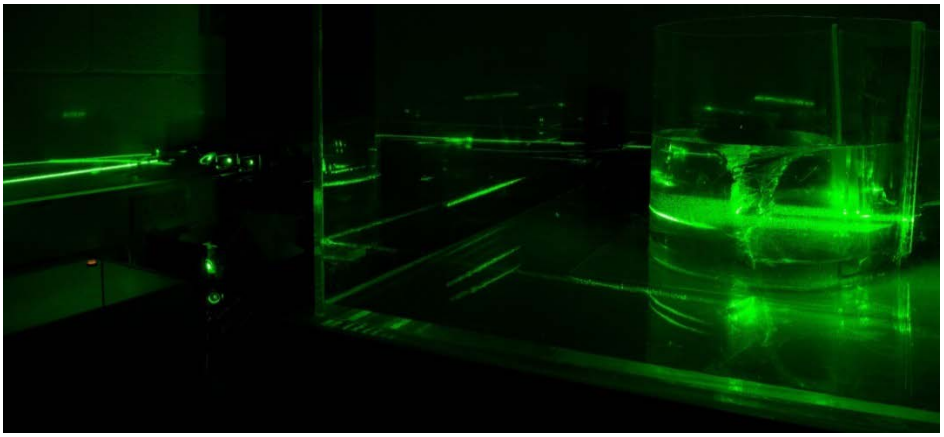
Annonce de conférence

Mardi 23.08.2016 à 17:15, Salle GC C2 413 (Génie civil)
(http://plan.epfl.ch/?room=GC%20C2%20413)

Dr Sean Mulligan, Research Associate, National University of Ireland, Galway, Ireland

Experimental and numerical analysis of three-dimensional free-surface turbulent vortex flows with strong circulation



2D Laser particle tracking velocimetry system applied to a strong free-surface vortex flow chamber at the IT Sligo Laboratory of Hydraulics Research

Strong free-surface vortex flows are widely employed in various civil engineering and industrial applications such as energy dissipation, flow retention, hydroelectric power generation and water treatment. However, a review of the state-of-the-art suggests that a number of areas surrounding the underlying flow mechanics in these systems require additional attention. The talk will present some of the main findings on the PhD study "*Experimental and numerical analysis of three-dimensional free-surface turbulent vortex flows with strong circulation*" which was recently completed at the Institute of Technology, Sligo in October 2015.

The research focused on investigating the behaviour of strong free-surface vortex flows using experimental and numerical analysis complemented by analytical approaches. Experimental modelling was performed in two phases: investigation into the effects of the approach flow geometry and an exploration of the mean three-dimensional velocity fields and secondary flow processes. Twelve geometries of a typical scroll type vortex chamber were independently tested in a customised hydraulic test rig by measuring the key hydraulic parameters in addition to the mean velocity fields by laser particle tracking velocimetry. Three-dimensional numerical modelling of the strong free-surface vortex was performed using an Eulerian-Eulerian homogeneous multiphase flow model in the ANSYS CFX computational fluid dynamics code. The steady and unsteady simulations were tested using various turbulence models and was benchmarked using the experimental data. The findings of this phase of the study have outlined some key rules of thumb which should be implemented when modelling free-surface flows with strong rotational characteristics.

Bio: *Dr Sean Mulligan is a research associate at the National University of Ireland, Galway (NUIG). He is currently working on a number of interdisciplinary research projects including hydraulic structures, water distribution networks (WATERNOMICS), waste water systems (INNOQUA), Irish aquaculture (MoreFish) and on the design of novel aeration systems.*

Duration: 30 minutes presentation + 15 minutes Q&A.

Dr Giovanni DE CESARE & Dr Pedro MANSO

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