

Young Professionals Network

CARDIFF

IAHR Cardiff Young Professionals Network

Who we are

- Subsection of International Association of Hydro-environment Engineering and Research (IAHR)
- Collaboration between Cardiff School of Engineering's Hydro-environmental Research Centre (HRC) and local companies who specialise in hydro-environmental engineering

ARUP



History

Previous incarnation: IAHR Student Chapter, Cardiff

- PhD students only
- Set up to encourage students to become active in the international hydro-environmental community

September 2013

- Transformed to YPN to include Research Associates
- Cardiff first to include local companies who specialise in hydro-environmental engineering



Objectives

- Strengthen the crossover between industry and academia
- Develop key professional skills for young professionals
- Encourage other YPNs to follow our example

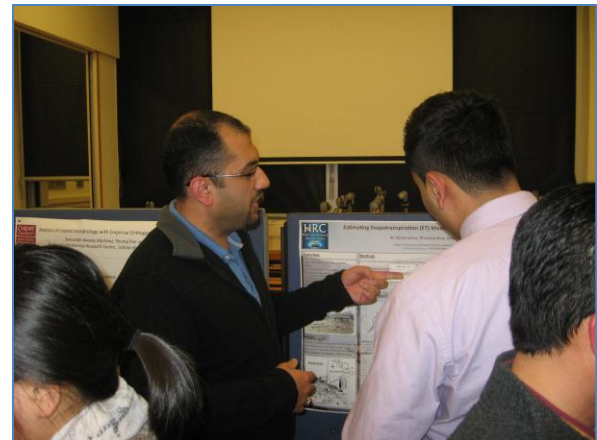
Strategy

- Invite local companies to join, one-by-one
- Approach government agencies and organisations who work with industry
- Create an inclusive, collaborative ethos
- Future collaboration with CIWEM?



Membership & benefits

- PhD students, RAs, and industry professionals under 30 years of age
- Networking opportunities
- Increased understanding of how industry/academia works
- Friendly environment
- Shared expertise



Shared expertise

Cardiff University:

- Modelling water quality effects of Severn Barrage
- Water quality assessment in rivers, bathing waters
- Novel turbine design (physical/numerical modelling)
- SUDS and stormwater treatment
- Biofouling in pipes
- River losses in semi-arid basins (hydrological modelling)
- Multiphase flow modelling – applicable to deep ocean oil blowouts
- Modelling effects of coastal structures on morphodynamics

Shared expertise

Arup:

- Implementing Welsh Water's AMP5 Framework, focus on improvement of sewer networks across the country
SUDS/green infrastructure (Llanelli & Gowerton, Greener Grangetown)
- Clean water distribution
- Trunk main rehabilitation/diversions
- Sewage treatment works improvement
- Sewer and outfall rehabilitation
- Dam/reservoir assessments
- Hydraulic modelling/analysis; civil, mechanical and electrical design

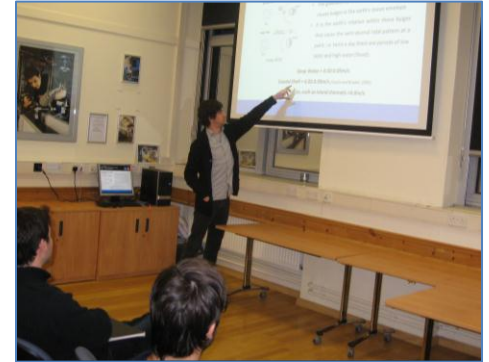
Shared expertise

CH2M HILL:

- “Salmon for tomorrow” - design and implementation of salmon, elver and eel passes
- Flood risk management – design of flood walls, non-return valves, flood resistant doors, automatic air bricks and in some cases glazed panels
- Surface water flood risk management – use of SUDS to reduce peak flows

Events

- First meeting held recently
- Presentation from HRC on novel turbine design
- Presentation from Arup on sustainable urban drainage in Llanelli and Gowerton area
- Poster display from PhD students
- Cardiff Bay Barrage Tour and further events in the pipeline



The Future

- Expand and include more local businesses, government agencies
- Guest speakers with expertise on relevant and current topics
- Tours
- Social events
- Liaise with other YPNs to help them make the transition

<http://hrc.engineering.cf.ac.uk/iahr-young-professionals-network>

Hydro-Environmental Research Centre

CFD and Laboratory Model Studies for Optimal Chlorine Contact Tank Performance

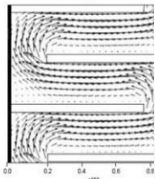
Athanasios Angeloulis, First Year PhD Student
Supervisors: Dr W B Raven and Prof A Falconer

Project Summary
The research project focuses on the further development of Computational Fluid Dynamics Chlorine Contact Tank (CCT) processes, using numerical and laboratory modelling method enhance the simulation capability of the flow, mixing and disinfection processes, as well chlorine compounds and the formation of by-products.

Numerical Modelling

The study has been revolving around the use of custom made software developed at Cardiff University. There is CONTANK which is a two-dimensional CFD software specific to the processes appearing in contact tanks, based on the more popular DVAST source code, and STRATUS, a more recent source code that was developed.

- Currently examining models with simplified geometries to appreciate the accuracy of the output of each turbulence model compared to previous experimental studies.
- Hydrodynamic conditions, Salute transport as well as Disinfection processes are parameters aiming to accurately represent.
- Future work will aim at the refinement of software by applying methods that incorporate considerations of recent CCT research.
- Laboratory experiments will be later used to validate the results.



Flow Pattern based on CFD results, while turbulence model, (STRATUS software)



Photograph of the Prototype Tank, illustrating the setup with 8 compartments, implemented for the experimental aspect of the project.

Physical Modelling
Laboratory experiments are going to constitute a proportion of this study:

- Plans include the use of Acoustic Doppler to obtain results for hydrodynamic conditions.
- Tracer experiments are applied to transport and supply hydraulic efficiency, baffling configurations.
- The potential of experiments dealing with reactions is still examined and is included prospects of this study.

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Cardiff School of Engineering School Research
Hydro-environmental Research Centre

- Introduction**
- Hydraulics Laboratory
 - CH2M Hill Sponsorship
 - IAHR Young Professionals Network
 - IAHR YPN Events
 - Technical Visits
 - Social Events
 - Contact us
 - Research Projects
 - People
 - Research Studentship Opportunities
 - WISE Centre for Doctoral Training
 - BHS Peter Wolf Event 2014

Young Professionals Network Events

The first event as a part of the Cardiff University Young Professional Network kicked off on November 26th, 2013. This event was attended by members from Arup, CH2M HILL, and several PhD students and academic staff of Cardiff University.

After the welcome speech by Rhodri Lucas (president of CU-YPN), Prof. Roger Falconer (President of the IAHR), Mr. David Evans (Arup), and Mr. Kishan Patel (CH2M HILL) spoke about the benefits of being involved in YPN. In particular, the advantages of having a platform for interaction and collaboration between researchers and working professionals was briefed upon. Following this, one of our students, Tom Harris presented part of his PhD work on tidal power: "Physical modelling of Carbine - a vertical axis tidal turbine" and Mas Louise Ellis & Mr Chris Ellis from Arup presented details on one of their projects: "Water Sensitive Urban Design - Llaneli & Gwvorton Catchment Strategy".

Finally the event concluded with a poster display session which presented an opportunity for everyone to interact in a more relaxed atmosphere, providing an ideal situation for networking.

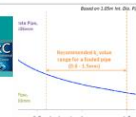


Hydro-Environmental Research Centre

Assessing the Impact of Fouling Processes on the Hydraulic Efficiency of Pipelines

Matthew Cowle, PhD Student
Academic Supervisors: Dr W B Raven and Prof B Lin
Industrial Supervisor: Dr V Samarais

Project Summary
High Density Polyethylene (HDPE) pipes are, reportedly, less prone to fouling than most traditional pipe materials, such as concrete, although further quantitative studies are needed to better establish the influence of fouling processes, in particular with respect to their influence upon the hydraulic efficiency.



he pipe discharge (Colebrook-White eq) of Pipelines

Pipes used in water management systems, drainage networks, sea outfalls are generally assessed in survey flow.

It designed and operated, to ensure a possible flow capacity for a given energy losses and operational costs. energy losses in pipelines is friction factor, which tends to increase with the pipe. Wall roughness can be vertical size, orientation, geometric by the simple engineering parameter grain roughness (ks), as used in the



Fig. 2 Experimental setup

Experimental Work

A clean pipe experiment has been conducted (Fig. 2) to verify the ks value of new HDPE pipes under controlled laboratory conditions, and to develop and validate a procedure for assessing the surface roughness of HDPE pipes. The subject of the experiment was a 17m long, 0.6m internal diameter HDPE pipeline section. The ks value for the tested HDPE pipe was confirmed from this study to be 0.033mm (Fig. 3). Future tests with fouled pipe sections will be specially conducted to evaluate the impact of fouling by processes such as sediment accumulation and sliming (biofouling).

Mechanisms

It subjected to field conditions, as hydraulic efficiency is impacted by the formation of slime, scale, silt. In the build up of sediment and the of bed forms such as ripples, dunes, processes will notably increase the overall grain pipe, which is reflected in calculating a possible ks parameter. Furthermore, in some pipes, water surface waves may develop, by factors in which biological materials adhere to the surface of the pipe, forming a microbiological (slime) layer, known as a sediment can also lead to increased resistance in which it is a function of the thickness and morphology, which in turn is a function of the operation conditions. This project will evaluate how such complex two-way feedback mechanisms affect pipeline efficiency undergoing fouling.

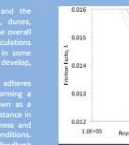


Fig. 3 Experimental results, in the form of a Moody diagram

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THANK YOU