

Editorial: Special Issue on Hydroinformatics: Water Supply

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The eighth international conference on Computing and Control for the Water Industry (CCWI2005) was dedicated to the theme 'Water management for the 21st Century'. With the steady growth in the use of computers in daily life, computers are commonly used for analysis and modelling of water systems, and also for information handling and informed decision-making. The ability to acquire, analyse and use data to one's advantage is a defining difference in the management of modern water and sewerage systems.

The aims of the conference were to

- (a) facilitate continued co-operation between academic institutions and industry
- (b) examine the current state-of-the-art computing and control techniques as applied to the water industry
- (c) provide a forum for discussion and dissemination of ideas on applied computing and control for the water industry, with particular emphasis on providers' and users' perspectives and future needs.

More than one hundred papers by leading academics and industry practitioners from over twenty countries were presented at the conference, covering different issues in water supply and wastewater industries. The topics addressed include asset management, operations control, hydraulics analysis and control, hydroinformatics, optimisation and reliable performance of water systems.

This special issue of *Proceedings of ICE – Water Management* represents a selection of the aforementioned papers. Asset management is currently, and most likely will be so in the perceived future, one of the main topics of interest to the UK water industry. Driven by the regulator (OFWAT), this topic has received a lot of attention lately from both practitioners and researchers. This fact is reflected in the selection of three papers presented in this special issue. The paper by Boxall *et al.* addresses the issue of pipe performance deterioration by developing the model for the estimation of burst rates in water distribution mains. The model makes use of Bayesian statistical techniques that balance the burst prediction based on a pipe's attributes (length, material, diameter and age) as well as a pipe's recent burst history. The paper by Rajani and Tesfamariam estimates the time to failure of cast-iron pipes by combining the corrosion model of these pipes with the corresponding pipe-soil interaction model. Finally, the paper by Misiunas *et al.* addresses the issue of asset deterioration by presenting the

hydraulic-transients-based technique for transmission pipe condition assessment.

A substantial number of the papers published at the conference were related to the topic of optimal water systems operation. The paper by Rao *et al.* presents an adaptive optimisation model for dynamic operational control of water supply and distribution networks. The model is based on the combined use of an artificial neural network for predicting the consequences of different pumps and valve settings, and a genetic algorithm for the overall energy cost minimisation. The methodology developed makes use of both current and future system demands. The genetic algorithm optimisation method is also used in the paper by Farmani *et al.* where a model for optimal hydraulic and water quality real-time control of a regional water supply system is presented. The main objective in the development of an online model was to decrease the operational cost of the system by optimising the operation of pumping stations that, in turn, was achieved by improving the rules used to control the inflow into the associated storage tanks.

Another topic that received significant attention at the conference is the topic of water distribution leakage. A paper by van Zyl and Clayton is presented here. This paper analyses different factors potentially affecting the general pressure-leakage relationship and leakage exponent value in particular. The four factors considered are leak hydraulics, pipe material behaviour, soil hydraulics and water demand. While all of these factors certainly have an effect on the aforementioned relationship, laboratory tests seem to indicate that pipe material behaviour is probably the most important one as it can explain the whole range of leakage exponent values previously observed in the field.

Last but not least, the topic of water demand management and forecasting also attracted substantial attention from the conference participants. The paper by Tricarico *et al.* develops a mathematical model that predicts the peak system water consumption from the number of its users. The model is developed by performing the relevant statistical analyses on previously recorded real-life demand data for a small water system in Italy. The results obtained also demonstrate that the stochastic peak water demands are best described by using either the log-normal or the Gumbel distribution. We have also included an interesting related general paper by Vairavamoorthy *et al.* accepted for publication by the editorial panel. This paper discusses the contamination of water distribution systems and introduces a new tool called integrated risk assessment of water distribution

systems (IRA-WDS) that is anticipated to enable engineers to manage water quality more effectively.

We expect this special issue to increase the awareness of the important role of hydroinformatics in managing today's water systems as well as the development of water management strategies for the coming years.

Finally, our apologies to Michael Pfister, who was omitted from our list of 2006 referees. We greatly appreciate the efforts of all of our expert colleagues and could not maintain the high standards of the papers published in the journal without them.

Enjoy reading the papers!