WDSA 2016 Water Distribution Systems Analysis
24 - 28 July 2016 // Cartagena, Colombia

WDSA2016 Conference Program

Monday, July 25th

Session 1 8:30-10:00 a.m.

Room 1: Analysis and Design
Chairperson: Bruno Brunone

Exact Skeletonization Method in Water Distribution Systems for Hydraulic and Quality Models

Daniel Mora-Meliá, F. Javier Martínez-Solano, Pedro L. Iglesias-Rey, Vicente S. Fuertes-Miquel
Universidad Politécnica de Valencia (Spain) & Universidad de Talca (Chile)

Feasibility of Mass Balance Approach to Water Distribution Network Model Calibration

Luigi Berardi, Antonietta Simone, Daniele Laucelli, Orazio Giustolisi
Politecnico di Bari (Italy)

Network Sectorisation through Aggregation of Strong Connected Components

Željko Vasilić, Miloš Stanić, Dušan Prodanović, Zoran Kapelan
University of Belgrade (Serbia) & University of Exeter (UK)

Segment-based Reliability Assessment for Water Distribution Systems

Erika Hernandez & Lindell Ormsbee
University of Kentucky & Kentucky Water Resources Research Institute (USA)

Room 2: Managing Water Distribution Systems
Chairperson: Kevin Lansey

Formulation of the Pump Operation Optimization Problem for a Harvested Stormwater System

Lisa J. Blinco, Angus R. Simpson, Martin F. Lambert, Angela Marchi
The University of Adelaide & Monash University (Australia)

Minimizing Excess Pressures by Optimal Valve Location and Opening Determination in Water Distribution Networks

Gençer Gençoğlu & Nuri Merzi
Middle East Technical University (Turkey)

Network Analysis, Control Valve Placement, and Optimal Control of Flow Velocity for Self-Cleaning Water Distribution Systems

E. Abraham, E. J. M. Blokker, I. Stoianov
Imperial College London (UK) & KWR Watercycle Research Institute (Netherlands)

Optimal Placement of Pressure Sensors in Water Distribution Systems Based on Clustering Analysis of Pressure Sensitive Matrix

Li Cheng, Du Kun, Tu Jia-peng, Dong Wei-xin
Kumming University of Science and Technology, Kumming Municipal Engineering Design Science Research Institute Co., Ltd., Yunnan Century Sunshine Architectural Design Co., Ltd. (China)

Session 2 10:30 a.m.-12:00 p.m.

Room 1: Analysis and Design
Chairperson: Luigi Berardi

Accuracy of First-order and Second-moment Approximation for Uncertainty Analysis of Water Distribution Systems

Hwee Hwang, Kevin Lansey, Donghwi Jung
The University of Arizona & Korea University Seoul

Analytical Solution of Jacobian Matrices of WDS Models

Liu Nian-dong, Du Kun, Tu Jia-peng, Dong Wei-xin
Kumming University of Science and Technology, Kumming Municipal Engineering Design Science Research Institute Co., Ltd., Yunnan Century Sunshine Architectual Design Co., Ltd. (China)

Application of Source Tracing-based Decomposition Approach for Optimal Cost Design of Water Distribution Networks

Ho Min Lee, Do Guen Yoo, Ali Sadollah, Joong Hoon Kim
Korea University, K-water Institute (South Korea), Islamic Azad University (Iran)

Redundancy Features of Water Distribution Systems

A. Di Nardo, M. Di Natale, C. Giudicianni, D. Musmarra, J.M. Rodriguez Varela, G.F. Santonastaso. A. Simone, V. Tzatchkov
Second University of Naples (Italy), Action Group CTRL+SWAN of the European Innovation Partnership on Water (European Union), Mexican Institute of Water Technology (Mexico), Politecnico di Bari (Italy)

Room 2: Managing Water Distribution Systems
Chairperson: Angus Simpson

A Response Methodology for Reducing Impacts of Failure Events in Water Distribution

Zoran Kapelan, Dragan Savić, Herman Mahmoud
University of Exeter (UK)

Data Assimilation in Water Distribution Systems

Cristiana Bragallia, Matteo Fortinia, Ezio Todini
University of Bologna (Italy)

Emergency Management of Water Distribution Systems: the Nodal Demand Control

Fiorini Morosini A., Caruso O., Costanzo F., Savic D.
University of Calabria, University of Ferrara (Italy), University of Exeter (UK)

Pump Scheduling for a Large Water Distribution Network: Milan, Italy.

Mario Castro-Gama, Quan Pan, Emilio Attilio Lanfranchi, Andreja Jonoski, Dimitri P. Solomatine
UNESCO-IHE (Netherlands) & Metropolitana Milanese S.p.A (Italy)

Session 3 2:00-3:30 p.m.

Room 1: Analysis and Design
Chairperson: Pedro Iglesias

Generation and Validation of a Set of Synthetic WDS Case Studies Using Graph Theory and Reliability Indexes

Paez, D. & Filion, Y.
Queen's University (Canada)

Investigating the Impact of Employing Different Warm Initial Solution Approaches on Multi-objective Optimal WDS Design Solutions

Young Hwan Choi, Donghwi Jung, Ho Min Lee, Do Guen Yoo, Joong Hoon Kim
Korea University & K-water Institute (South Korea)

Serious Game Approach to Water Distribution System Design and Rehabilitation Problems

Mark S. Morley, Mehdi Khoury, Dragan A. Savić
University of Exeter (UK)

Spectral Clustering and Genetic Algorithm for Design of District Metered Areas in Water Distribution Systems

Rui Han & Jun Liu
Yanshan University (China)

Room 2: Managing Water Distribution Systems
Chairperson: Steve Buchberger

Asset Management of Water Distribution Networks Based on Risk Detection (Case Study)

Farhad Yazdandoost, Ardalan Izadi
Toosi University of Technology (Iran)

Responsiveness of a Water Distribution Network against the Valve Operation

Juan Pablo París & Juan Saldarriaga
INGETEC & Universidad de los Andes (Colombia)

Slug Flow Simulation: a Way to Improve Air Scouring of Water Mains?

Florent Pourcel, Ivar Eskerud Smith, Sophie Duchesne
National Institute of Scientific Research (Quebec, Canada) & Norwegian University of Science and Technology

Strategies to Improve the Energy Efficiency of Pressurized Water Systems

Enrique Cabrera, Elena Gómez, Vicent Espert, Enrique Cabrera Jr.
Universidad Politécnica de Valencia (Spain)

Session 4 4:00-5:30 p.m.

Room 1: Analysis and Design
Chairperson: Walter Grayman

Energy Optimization of Supplied Flows from Multiple Pumping Stations in Water Distribution Networks

C.F. León Celi, P.L. Iglesias-Rey, F.J. Martínez Solano
Universidad Politécnica de Valencia (Spain)

Population Size Influence on the Efficiency of Evolutionary Algorithms to Design Water Networks

Daniel Mora-Melià, F. Javier Martínez-Solano, Pedro L. Iglesias-Rey, Jimmy H. Gutiérrez-Bahamondes
Universidad de Talca (Chile) & Universidad Politécnica de Valencia (Spain)

Sensitivity Analysis of Topological Subgraphs within Water Distribution Systems

Jochen Deuerlein, Olivier Piller, Sylvan Elhay, Angus Simpson
3S Consult GmbH (Germany), Irstea (France), University of Adelaide (Australia)

The Optimal Design of Series of Pipes in Sewer Systems

Natalia Duque, Daniel Duque, Juan Saldarriaga
Universidad de los Andes (Colombia)

Room 2: Hydraulics, Innovative Uses of Sensor Data
Chairperson: James Uber

A Shazam-like Household Leakage Detection Method

Solomon Seyoum, Leonardo Alfonso, Schalk Jan van Andel, Wouter Koole, Ad Groenewegen, Nick van de Giesen
Integrated Water Systems and Governance Department & TU Delft (Netherlands)

Groundwater Supply and Climate Change Management by Means of Global Atmospheric Datasets: Preliminary Results

Paolina B. Cerlini, Silvia Meniconi, Bruno Brunone
University of Perugia (Italy)

Hydraulic Modelling for Pressure-reducing Valve Controller Design Addressing Disturbance Rejection and Stability Properties

Tomasz Janus & Bogumil Ulanicki
De Montfort University (UK)

Verifying Pressure-dependent Demand Modeling

Tom Walski, Devin Blakley, Matthew Evans, Brian Whitman
Bentley Systems & Wilkes University (USA)

Tuesday, July 26th

Session 1 8:30-10:00 a.m.

Room 1: Analysis and Design
Chairperson: Angela Marchi

A System for Optimal Design of Pressure-constrained Branched Piped Water Networks

Nikhil Hooda & Om Damani
Indian Institute of Technology (India)

Inconsistencies in Pressure-driven Analysis of Water Distribution Systems

Sasha Schück, Hwee Hwang, Kevin Lansey
Universidad Técnica Federico Santa María (Chile) & University of Arizona (USA)

PMA Partition Method of Water Distribution Network Combined with Graph Theory

Jinliang Gao, Yongpeng Xu, Fang Yao, Guosheng Sun, Chengzhi Zheng, Shihua Qi, Fuyi Cui
Harbin Institute of Technology & Guangdong Holding Limited (China)

Ranking Alternatives for the Flexible Phased Design of Water Distribution Networks

João Marques, Maria Cunha, Dragan Savić
Marine and Environmental Science Centre (Portugal) & University of Exeter (UK)

Room 2: Hydraulics, Water System Security
Chairperson: Edo Abraham

A Toolkit for Water Distribution Systems' Simulation using the Loop Method and High Performance Computing

Fernando Alvarruiz, Fernando Martínez Alzamora, Antonio M. Vidal
Universidad Politécnica de Valencia (Spain)

Hybrid Optimization Proposal for the Design of Collective On-rotation Operating Irrigation Networks

Carmen M. Lapo, Rafael Pérez-García, Joaquín Izquierdo, David Ayala-Cabrera
Universidad Técnica Particular de Loja (Ecuador) & Universidad Politécnica de Valencia (Spain)

Incorporating Operational Uncertainty in Early Warning System Design Optimization for Water Distribution System Security

Nathan Sankary & Avi Ostfeld
Israel Institute of Technology (Israel)

Predicting the Head-area Slopes of Circular Holes in Water Pipes

Rene Nsanzubuhoro, Jakobus E van Zyl, Alphose Zingoni
University of Cape Town (South Africa)

Session 2 10:30 a.m.-12:00 p.m.

Room 1: Crosscutting Topics
Chairperson: Dominic Boccelli

A Proposal of Optimal Sampling Design Using Infrastructure Modularity

Antonietta Simone, Luigi Berardi, Daniele Laucelli, Orazio Giustolisi
University of Bari (Italy)

Characterization of Modular Deposits for Urban Drainage Networks Using CFD Techniques

Sánchez-Beltrán, H., Montes Rodríguez, C.D., Barrera Triviño, J.C., Iglesias-Rey, P. H., Saldarriaga Valderrama, J., Martínez-Solano, F. J.
Universidad de los Andes (Colombia) & Universidad Politécnica de Valencia (Spain)

Integrating Water, Waste, Energy, Transport and ICT Aspects into the Smart City Concept

Anna Strzelecka, Bogumil Ulanicki, Stef Koopb, Laurence Koetsier, Kees van Leeuwen, Richard Elelman,
De Montfort University (UK), KWR Watercycle Research Institute (Netherlands), Fundació CTM Centre Tecnologic (Spain)

Pseudo-genetic Model Optimization for Rehabilitation of Urban Storm-water Drainage Networks

Pedro L. Iglesias-Rey, F. Javier Martínez-Solano, Juan G. Saldarriaga, Vicente R. Navarro-Planas
Universidad Politécnica de Valencia (Spain) & Universidad de los Andes (Colombia)

Room 2: Smart Networks
Chairperson: Dragan Savic

Near Real Time Pump Optimization and Pressure Management

Bruno M. Brentan, Edevar Luvizotto Jr., Ideal Montalvo, Joquín Izquierdo, Rafael Pérez-García
Cidade Universitaria Campinas (Brazil), IngeniousWare (Germany), Universidad Politécnica de Valencia (Spain)

Selection of Pumps as Turbines Substituting Pressure Reducing Valves

Gustavo Meirelles Lima, Edevar Luvizotto Junior, Bruno Melo Brentan
University of Campinas (Brazil)

Statistical process control based system for approximate location of pipe bursts and leaks in water distribution systems

Michele Romano, Kevin Woodward, Zoran Kapelan
United Utilities & University of Exeter (UK)

Water Supply Operation and Planning System with Electric Power and DR Function

Shinsuke Takahashi, Hiroshi Koibuchi, Shingo Adachi
Research & Development Group, Hitachi, Ltd. & Service & Platform Business Unit, Hitachi, Ltd. (Japan)

Session 3 2:00-3:30 p.m.

Room 1: Pipeline Engineering, Practice and Case Studies
Chairperson: Graeme Dandy

Aqualibrium Competition: Laboratory Data and EPANET Simulations

Silvia Meniconi, Bruno Brunone, Kobus van Zyl, Elisa Mazzetti
University of Perugia (Italy) & University of Cape Town (South Africa)

Criteria of Minimum Shear Stress vs. Minimum Velocity for Self-Cleaning Sewer Pipes Design

Carlos D. Montes & Juan G. Saldarriaga
Universidad de los Andes (Colombia)

Peak Residential Demands in Homes with Efficient Water Fixtures – Results from a National Field Study

Steven Buchberger, Toritseju Omaghomi, Daniel Cole
University of Cincinnati & IAMPO (USA)

Pipe Failure Prediction in Water Distribution Systems Considering Static and Dynamic Factors

Raziyeh Farmani, Konstantinos Kakoudakis, Kourosh Behzadian, David Butler
University of Exeter & University of West London (UK)

Room 2: Smart Networks
Chairperson: Zoran Kapelan

Extending the Envelope of Demand Response Provision through Variable Speed Pumps

R Menke, E Abraham, P Parpas, I Stoianov
Imperial College London (UK)

Optimized Deep Learning Framework for Water Distribution Data-Driven Modeling

Zheng Yi Wu & Atquir Rahman
Bentley Systems, Incorporated (USA)

Sampling Design for Leak Detection in Water Supply Networks

Maria Mercedes Gamboa-Medina & Luisa Fernanda Ribeiro Reis
University of São Paulo (Brazil)

State Estimation for Water Distribution Networks in the Presence of Control Devices with Switching Behavior

Francesco Fusco & Ernesto Arandia
IBM Research Ireland (Ireland)

Session 4 4:00-5:30 p.m.

Room 1: Open Source EPANET
Chairperson: Kobus van Zyl

A New Non-iterative Method for Pressure-Driven Snapshot Simulations with EPANET

E. Pacchin, S. Alvisi, M. Franchini
University of Ferrara (Italy)

Extending EPANET Capabilities with Add-in Tools

P.L. Iglesias-Rey, F.J. Martínez-Solano, J.V. Ribelles-Aquilara
Universidad Politécnica de Valencia (Spain)

Integrating Water Temperature Simulation in Water Distribution Systems Modelling with EPANET-MSX

Helga Hubeck-Graudal, Brian Elmegaard, Torben Ommen, Martin Rygaard
Technical University of Denmark (Denmark)

Pump Operation Optimization Using Rule-Based Controls

Angela Marchi, Angus R. Simpson, Martin F. Lambert
University of Adelaide & Cooperative Research Centre for Water Sensitive Cities (Australia)

Room 2: Water Quality
Chairperson: Orazio Guistolisi

Can there be a Law of Conservation of Turbidity?

Tom Walski, Kendric Minnich, Corbin Sherman, Lee Strause, Brian Whitman
Bentley Systems & Wilkes University (USA)

Correlation of Arsenic and Fluoride in the Groundwater for Human Consumption in a Semiarid Region of Mexico

Navarro O., González J., Júnez-Ferreira, H.E., Bautista C-F., Cardona A
Universidad Autonoma de Zacatecas & Universidad Autonoma de San Luis Potosí (Mexico)

Predicting the Formation of Haloacetonitriles and Haloacetamides by Simulated Distribution Systems Tests

Chrysoula Sfynia, Tom Bond, Rakesh Kanda, Michael R. Templeton
Imperial College London, Brunel University London, Anglian Water Services Ltd. (UK)

Water Age Clustering for Water Distribution Systems

Elad Salomons & Avi Ostfeld
OptiWater & Israel Institute of Technology (Israel)

Session 5 5:30-6:30 p.m.

Rooms 3 & 4 (joined): Featured Presentation: An Environmental History of Cartagena's Dique Canal and other Infrastructures

Renowned historian, ex-congressman, and public figure José Vicente Mogollón will be sharing with us the intriguing and somewhat tragic story of the Dique Canal, which connects Cartagena to Colombia's emblematic Magdalena River.

Wednesday, July 7th

Session 1 8:30-10:30 a.m.

Rooms 3 & 4 (joined): Presentations by Colombian Water Utilities

These presentations will describe the water distribution systems of Colombia's main cities, including coastal cities with pumping systems, and populated cities in the Andes Mountains, in which water is supplied by means of gravity.

Session 2 11:00-12:30 p.m.

Room 1: Water Demand
Chairperson: Tom Walski

A Water Distribution System Model to Simulate Critical Scenarios by Considering both Leakage and Pressure Dependent Demands

María Pilar Conejos, Fernando Martínez Alzamora, Joan Carles Alonso
Grupo Aguas de Valencia & Universidad Politécnica de Valencia (Spain)

Demand Estimation in Water Distribution Systems: Solving Underdetermined Problems Using Genetic Algorithms

Nhu Do, Angus Simpson, Jochen Deuerlein, Olivier Piller
University of Adelaide (Australia), 3S Consult GmbH (Germany), National Research Institute of Science and Technology for Environment & Agriculture (France)

Hybrid Optimization Method for Strategic Control of Water Withdrawal from Water Reservoir with Using Support Vector Machines

Pavel Mensik & Daniel Marton
Brno University of Technology (Czech Republic)

Parameter Estimation of Seasonal Arima Model for Water Demand Forecasting by Harmony Search Algorithm

Paulo José Oliveira, Jorge Luiz Steffen, Peter Cheung
University of Cincinnati (USA) & Federal University of Mato Grosso (Brazil)

Room 2: Water Losses
Chairperson: Ezio Todini

Experimental Investigation into the Influence of Backfill Types on the Vibro-acoustic Characteristics of Leaks in MDPE Pipe

Joseph D Butterfield, Richard P Collins, Anton Krynkina, Stephen B.M Beck
University of Sheffield (UK)

Real-World Comparison of Sensor Placement Algorithms for Leakage Localisation

Daniela Fuchs-Hanusch, Laura Ramaseder, David Steffelbauer
Graz University of Technology (Austria)

Safe Transients for Pipe Survey in a Real Transmission Main by Means of a Portable Device: the Case Study of the Trento (I) Supply System

Silvia Meniconi, Bruno Brunone, Matteo Frisinghelli, Elisa Mazzetti , Maurizio Larentis, Chiara Costisella
University of Perugia & Dolomiti Reti SpA (Italy)

Simultaneous Calibration of Leakages, Demands, and Losses from Measurements: Application to the Guayaquil Network (Ecuador)

F. Javier Martínez-Solano, Pedro L. Iglesias-Rey, Stephenson X. Molina Arce
Universidad Politécnica de Valencia (Spain)

Session 3 2:00 p.m.-3:30 p.m.

Room 1: Water Demand
Chairperson: Javier Martínez

Gene Expression Programming in Long-term Water Demand Forecasts Using Wavelet Decomposition

Peyman Yousefi, Sina Shabani, Hadi Mohammadi, Gholamreza Naser
The University of British Columbia (Canada)

Limitations on Real Time Demand Estimation in Water Distribution Systems

Angela Marchi, Graeme C. Dandy, Dominic L. Boccelli
University of Adelaide (Australia) & University of Cincinnati (USA)

Support Vector Machines in Urban Water Demand Forecasting Using Phase Space Reconstruction

Sina Shabani, Peyman Yousefi, Gholamreza Naser
The University of British Columbia (Canada)

The Overall Pulse Model for Water Demand of Aggregated Residential Users

F. Di Palma, R. Gargano, F. Granata, R. Greco
Universita di Cassino e del Lazio Meridionale & Seconda Universita degli Studi di Napoli (Italy)

Room 2: Water Losses
Chairperson: Zheng Wu

A Two-Stage Calibration for Detection of Leakage Hotspots in a Real Water Distribution Network

Sophocles Sophocleous, Dragan A. Savić, Zoran Kapelan, Orazio Giustolisi
University of Exeter (UK) & University of Bari (Italy)

Analysis Model of Physical Leakage Flow Based on Blind Source Separation Theory

Jinliang Gao, Yongpeng Xu, Guosheng Sun, Chengzhi Zheng, Shihua Qi, Fuyi Cui
Harbin Institute of Technology & Guangdong Holding Limited (China)

Leakage Localization with Differential Evolution: A Closer Look on Distance Metrics

D.B. Steffelbauer, M. Günther, D. Fuchs-Hanusch
Graz University of Technology (Austria)

Oscillation Pattern Comparison during a Hydraulic Transient in a Simple Pipe System with and without Leaks

Ruben Dario Montoya & Luis Javier Montoya
Universidad de Medellín (Colombia)

Session 4 4:00-5:30 p.m.

Room 1: Practice and Case Studies, Risk and Reliability
Chairperson: Jochen Deuerlein

Case Study: Evaluation of a Composite Demand-Hydraulic Modeling Framework

Paulo José Oliveira, S. M. Masud Rana, Tian Qin, Hyoungmin Woo, Jinduan Chen, Dominic L. Boccelli
University of Cincinnati & IDModeling (USA)

Consideration of Layout and Pipe Sizes for Water Distribution Network Design with Reliability

Rajesh Gupta & Shweta Rathi
Visvesvaraya National Institute of Technology (India)

Risk Assessment of Water Distribution Service

Rafet Ataoui, Ruggero Ermini, Willington Gonzalez
University of Basilicata (Italy)

Smart Solution to Improve Water-Energy Nexus for Water Supply System

Jorge Helmbrecht, Jordi Pastor, David Duro
Inclam Group (Spain)

Room 2: Water Quality
Chairperson: Rudy Gargano

Delivery of Safe Drinking Water via a Complex Distribution Network in South Africa – the Rand Water Approach

Lelethu Bungu, Kista Naidoo, Karl Lubout
Rand Water Board (South Africa)

Exploring the Use of Operational Interventions in Water Distribution Systems to Reduce the Formation of TTHMs

Claudia Quintiliani, Leonardo Alfonso, Cristiana Di Cristo, Angelo Leopardi, Giovanni de Marinis
University of Cassino and Southern Lazio (Italy) & UNESCO-IHE Institute for Water Education (Netherlands)

Modelling Bacterial Biomass in a Non-chlorinated Drinking Water Distribution Network

Monique Albert, Wim Hijnen, Jojanneke van Vossen, Mirjam Blokker
KWR (Netherlands)

Water Quality Modeling Considering Incomplete Mixing in Extended Periods with Different Demand Patterns in Junctions

Nicolás Páez, Juan Saldarriaga, Jessica Bohorquez
Universidad de los Andes (Colombia)

Thursday, July 28th

Session 1 8:30-10:30 a.m.

Rooms 1 & 2 (joined): Farewell Ceremony with the presence of the Colombian Ministry of Housing (MinVivienda)

Presentation by the Colombian Minister of Housing, City, and Territory, Dr. Elsa Noguera, and other presentations by Colombian potable water institutions

Session 2 11:00 a.m.-1:00 p.m.

Rooms 1 & 2 (joined): Sixth Battle of the Water Networks – District Meter Areas: Presentations & Results

Problem Statement

Jessica Bohorquez
Universidad de los Andes

Iterative Multi-Level Algorithm for Network Sectorization into DMAs Using ASO and Deterministic Optimization Tools in a Multi-Objective Design Setting

Edo Abraham, Olivier Piller, Denis Gilbert, Idel Montalvo
Imperial College London & Irstea

The Battle of Water Networks DMAs – A Multistage Design Approach

Elad Salomons, Olya Skulovich, Avi Ostfeld
OptiWater & Israel Institute of Technology

Combining Skeletonization, Setpoint curves and Heuristic algorithms to define DMAs in the BWNDMA

F. Javier Martínez-Solano, Pedro L. Iglesias-Rey, D. Mora-Meliá, José V. Ribelles-Aguilar
Universidad Politécnica de Valencia & Universidad de Talca

Social network community detection and Hybrid Optimization for the Battle of the Water Networks DMA

Bruno Brentan, Enrique Campbell, Thaisa Goulart, Daniel Manzi, Gustavo Meirelles, Manuel Herrera, Joaquín Izquierdo, Edevar Luvizotto Jr., Rafael Pérez-García
University of Campinas, Berliner Wasserbetriebe, University of Bath, Universidad Politécnica de Valencia

Interactive Optimization Modeling for BWNDMA Challenge

Zheng Yi Wu & Atiqur Rahman
Bentley Systems

A Graph theory based configuration of Water Distribution Systems for optimum operation

Raziyeh Farmani, Farshid Rahmani, Karwan Muhmmed, Kourosh Behzadian
University of Exeter, Amirkabir University of Technology, University of Sulaimani, University of West London

Graphic and Semi-Automatic Approach for Designing District Meter Areas to Manage Pressure in a Water Distribution System

Jorge Pesantez, M. Ehsan Shafiee, Emily Zechman Berglund, G. Mahinthakumar
North Carolina State University & Sensus Inc.