

WDSA CCWI

Conference Programme

Valencia 18-22 July



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

2022



1. SUMMARY PROGRAM

DAY 1 - MONDAY JULY 18, 2022

08:00 - 09:00	Registration - ETSII (UPV)
9:00 - 13:30	<p>Short Courses held in parallel:</p> <ul style="list-style-type: none"> • The Digital Transformation and the New Perspectives for Planning and Management of Aqueducts: the role of the digital twins (Orazio Giustolisi, Politecnico di Bari, Italy). ETSII, Room 424. • Deep Learning with PyTorch for Urban Water Networks: from Multilayer Perceptrons to Graph Neural Networks (Riccardo Taormina, Dr. Riccardo Taormina – AldroLab, Department of Water Management, TU Delft, Netherlands). ETSII, Room 521. • Introduction to the EPANET-MATLAB Toolkit for Smart Water Networks research (Demetrios Eliades, KIOS Research and Innovation Center of Excellence, University of Cyprus). ETSII, Room 123 • Transient simulations in water networks (Lina Sela, Department of Civil, Architectural, and Environmental Engineering, The University of Texas at Austin, USA). ETSII, Room 124 • Managing Advanced Hydraulic Models with QGISRed plugin. From EPANET to Digital Twins (Fernando Martínez, Research Institute of Water and Env. Eng., IIAMA, Univesitat Politècnica de València (Spain). ETSII, Room 421
9:00 - 11:00	Short Courses - Part I
11:00 - 11:30	Coffee Break
11:30 - 13:30	Short Courses - Part II
19:30 - 20:30	Check-in (Las Arenas Hotel)
20:00 - 22:30	Icebreaker Party <i>Las Arenas Hotel</i>

DAY 2 - TUESDAY JULY 19, 2022

08:00 - 09:00	Registration - Conference Venue (Paraninfo UPV)
09:00 - 10:00	Opening Ceremony
10:00 - 10:30	Coffee Break
10:30 - 12:15	Parallel Sessions 1 1A. Drainage and Sewer Systems - I. <i>Moderator: Daniel Aguado García</i> 1B. Design of Water Distribution Systems - I. <i>Moderator: Maria Cunha</i> 1C. Water Quality in Water distribution systems - I. <i>Moderator: Dominic L. Boccelli</i> 1D. Analysis and Modeling of Water Distribution Systems - I. <i>Moderator: Olivier Piller</i> 1E. Demand Modeling of Water Distribution Systems - I. <i>Moderator: Steven Buchberger</i> 1F. Industry Track I - Water Quality. <i>Moderator: Donghwi Jung</i>
12:45 - 13:30	Plenary Session A. Dr. Pilar Conejos (Idrica) <i>Digital Twins for Water Distribution Systems</i>
13:30 - 15:15	Lunch
15:15 - 16:30	Parallel Sessions 2 2A. Drainage and Sewer Systems - II. <i>Moderator: Fulvio Boano</i> 2B. Design of Water Distribution Systems - II. <i>Moderator: Mario Castro-Gama</i> 2C. Water Quality in Water distribution systems - II. <i>Moderator: Yves Fillion</i> 2D. Analysis and Modeling of Water Distribution Systems - II. <i>Moderator: Orazio Giustolisi</i> 2E. Demand Modeling of Water Distribution Systems - II. <i>Moderator: Jochen Werner Deuerlein</i> 2F. Industry Track II - Asset Management. <i>Moderator: Paolo Vezza</i>
16:30 - 17:00	Coffee Break
17:00 - 18:00	Parallel Sessions 3 3A. Drainage and Sewer Systems - III. <i>Moderator: Luigi Berardi</i> 3B. Risk Analysis in Water distribution systems. <i>Moderator: Robert Sitzenfrey</i> 3C. Water Quality in Water distribution systems - III. <i>Moderator: Joby Boxall</i> 3D. Analysis and Modeling of Water Distribution Systems - III. <i>Moderator: Joaquim José de Oliveira Sousa</i> 3E. Leakage Analysis and Control - I. <i>Moderator: Kobus van Zyl</i> 3F. Industry Track III - Design & Digitalization. <i>Moderator: Bruno Brentan</i>
18:00 - 19:30	Networking / UPV Campus Tour
19:45	Bus transfer to Welcome Dinner
20:30 - 22:30	Welcome Dinner <i>Nou Racó Restaurant - Show Cooking Paella - Sunset at La Albufera Natural Park</i>
22:30	Bus transfer to UPV

DAY 3 - WEDNESDAY JULY 20, 2022

9:00 - 10:00	Plenary Session B. Prof. Helena Ramos (Instituto Superior Técnico—IST, Lisbon) <i>Water-energy-food nexus as a management strategy in smart cities and grids</i>
10:00 - 10:30	Coffee Break
10:30 - 12:15	Parallel Sessions 4
	4A. Battle of Intermittent Water Supply - I. <i>Moderator: F. Javier Martínez-Solano</i>
	4B. Energy Optimization of Water Networks - I. <i>Moderator: Helena Ramos</i>
	4C. Water Quality in Water distribution systems - IV. <i>Moderator: Mirjam Blokker</i>
	4D. Analysis and Optimization of Water Distribution Networks. <i>Moderator: Adeshola Ayodeji Ilemobade</i>
	4E. Leakage Analysis and Control - II. <i>Moderator: Didia Covas</i>
12:45 - 13:30	Plenary Session C. Dr. Carles Sanchis (Valencian Center for Irrigation Studies) <i>The end of a myth? Lights and shadows over the Valencia Water Court</i>
13:30 - 15:15	Lunch
15:15 - 16:30	Parallel Sessions 5
	5A. Intermittent Supply of Water Distribution Networks - I. <i>Moderator: Raziye Farmani</i>
	5B. Energy Optimization of Water Networks - I. <i>Moderator: Riccardo Taormina</i>
	5C. Water Quality in Water distribution systems - V. <i>Moderator: Stewart Husband</i>
	5D. Operation and Control of Water Distribution Networks - I. <i>Moderator: Avi Ostfeld</i>
	5E. Leakage Analysis and Control - III. <i>Moderator: David Bernhard Steffelbauer</i>
16:30 - 17:00	Coffee Break
17:00 - 18:00	Parallel Sessions 6
	6A. Intermittent Supply of Water Distribution Networks - II. <i>Moderator: Enrico Creaco</i>
	6B. Battle of the Leakage Detection and Isolation Methods (BattLeDIM, 2020). <i>Moderator: Demetrios G. Eliades</i>
	6C. Water Quality in Water distribution systems - VI. <i>Moderator: Vanessa Speight</i>
	6D. Operation and Control of Water Distribution Networks - II. <i>Moderator: Sarai Díaz García</i>
	6E. Leakage Analysis and Control - IV. <i>Moderator: P. Amparo López-Jiménez</i>
20:00 - 23:00	Conference Dinner <i>City of Arts and Sciences - Palau de Les Arts - Los Toros Restaurant</i>

DAY 4 - THURSDAY JULY 21, 2022

9:00 - 10:00	Plenary Session D. Prof. Raziye Farmani (University of Exeter) <i>Intermittent Water Supply Systems: Challenges, Opportunities and Solutions</i>
10:00 - 10:30	Coffee Break
10:30 - 12:15	Parallel Sessions 7
	7A. Battle of Intermittent Water Supply - II. <i>Moderator: Juan Saldarriaga</i>
	7B. Asset Management. <i>Moderator: Zoran Kapelan</i>
	7C. Water Quality in Water distribution systems - VII. <i>Moderator: Richard Collins</i>
	7D. Sensor Placement and Sectorization. <i>Moderator: Frances Pick</i>
	7E. Leakage Analysis and Control - V. <i>Moderator: Pilar Conejos Fuertes</i>
7F. Smart Solutions for Water Systems - I. <i>Moderator: Miguel Angel Jimenez Bello</i>	
12:45 - 13:30	Plenary Session E. Industry Track Nicolás Monterde (Idrica); Yolanda Martínez (Molecor); Vicente Sansaloni (Talis, Belgicast); Fernando Bernal (Bermad)
13:30 - 15:15	Lunch
15:15 - 16:30	Parallel Sessions 8
	8A. Battle of Intermittent Water Supply - III. <i>Moderator: Stefano Alvisi</i>
	8B. Free
	8C. Hydraulic Transients in Water Distribution Systems. <i>Moderator: Lina Sela</i>
	8D. Water Distribution Network Planning. <i>Moderator: Miguel Angel Jimenez Bello</i>
	8E. Wastewater and Water Treatment Plants. <i>Moderator: P. Amparo López-Jiménez</i>
8F. Smart Solutions for Water Systems - II. <i>Moderator: Dragan Savic</i>	
16:30 - 17:00	Coffee Break
17:00 - 17:45	Plenary Session F. Battle of Intermittent Water Supply (BIWS) <i>Prof. F. Javier Martínez Solano (UPV)</i>
17:45 - 18:00	Awards Ceremony - Venue for the next conference - Closing Ceremony

DAY 5 - FRIDAY JULY 22, 2022

8:30 - 13:30	Technical Tours
	La Albufera Natural Park. Visit to the Milia Artificial Wetland
	Turia Garden. Why does the city have a garden where there should be a river?
	La Presa Water Treatment Plant, a plant built in the 19th century and still in operation

2. DETAILED PROGRAM

2.1. Session 1. Tuesday July 19, 2022, 10:30-12:15

2.1.1. Session 1A. Room: A.1.06. Tuesday July 19, 2022, 10:30-12:15. Drainage and Sewer Systems - I. Moderator: Daniel Aguado García

- 14201 - Optimal design of sewer networks including topographic criteria and drop manholes (Juan Saldarriaga, Juana Herrán & Pedro L. Iglesias-Rey)
- 14791 - Economic comparison between an optimized sewer system design and a traditional design (Maria Alejandra Gonzalez, Juan Guillermo Saldarriaga)
- 14050 - Is water quality based stormwater management actually feasible? A SWMM-based study on the trade-offs of various stormwater management approaches (Kristjan Suits, Anatoli Vassiljev, Ivar Annus, Nils Kändler)
- 14186 - An approach to improve drainage networks based on the study of flood risk. (Leonardo Bayas-Jiménez, F. Javier Martínez-Solano, Pedro L. Iglesias-Rey & Fulvio Boano)
- 14138 - UrbanLemma: A serious game to support adoption of sustainable urban drainage solutions (Aashna Mittal, Lisa Scholten, Zoran Kapelan)
- 14144 - GIS-integrated pluvial flood risk assessment methodology for urban areas (Murel Truu Truu, Ivar Annus, Nils Kändler)

2.1.2. Session 1B. Room: A.1.07. Tuesday July 19, 2022, 10:30-12:15. Design of Water Distribution Systems - I. Moderator: Maria Cunha

- 14516 - A review on staged design of water distribution networks (Lydia Tsiami, Christos Makropoulos, Dragan Savic)
- 14709 - Multiobjective optimization of water distribution system under uncertainty using robust optimization (Avi Ostfeld, Sriman Pankaj Boindala)
- 14808 - An augmented multi-objective evolutionary algorithm for robust scenario-based optimization with application to water distribution systems design (Chao Zhang, Haixing Liu, Raziye Farmani & Huicheng Zhou)
- 14627 - Dynamic edge betweenness centrality and optimal design of water distribution networks (Mohsen Hajibabaei, Sina Hesarkazzazi, Amin Minaei, Dragan Savić, Robert Sitzenfrei)
- 14437 - An optimization framework for large water distribution systems based on complex network analysis (Robert Sitzenfrei)
- 14104 - Water distribution system design with behind-the-meter solar energy under various discount rates (Qi Zhao, Angus Simpson, Wenyan Wu & Ailsa Willis)

2.1.3. Session 1C. Room: A.1.10. Tuesday July 19, 2022, 10:30-12:15. Water Quality in Water distribution systems - I. Moderator: Dominic L. Boccelli

- 14143 - Towards chemical free drinking water distribution (Natalie Sarah Teresa Lamb, Isabel Douterelo, Stuart Knott, Adam Brookes & Joby Boxall)
- 14139 - Modelling of water mixing and renewal time in storage tanks (Didia Isabel Cameira Covas, Alexandre Pinheiro, Sofia Vaz, Laura Monteiro, Nuno Martins & Ana Margarida Ricardo)

- 14040 - Experimental study of mixing phenomenon in water distribution networks under real-world conditions (Reza Yousefian, Sophie Duchesne)
- 14734 - Disinfection by Products Estimation in a Water Distribution Network (Laura Vinardell Magre, Irene Jubany Güell, Ramon Pérez Magrané)
- 14789 - Grey-box dynamic model of a drinking water treatment plant (Blaž Korotaj, Mario Vašak, Hrvoje Novak)
- 14732 - Disinfection scheduling in water distribution networks considering input time-delay uncertainty (Stelios G. Vrachimis, Demetrios G. Eliades, Marios M. Polycarpou)

2.1.4. Session 1D. Room: A.1.11. Tuesday July 19, 2022, 10:30-12:15. Analysis and Modeling of Water Distribution Systems - I. Moderator: Olivier Piller

- 14074 - COSMOS – A framework for containerised, distributed creation, execution and analysis of hydraulic water distribution system models (Georg Arbesser-Rastburg, David Camhy, Daniela Fuchs-Hanusch)
- 14170 - On the use of SINDy and DMD for WDN (Mario Castro-Gama)
- 14776 - Domain Analysis of Water Distribution Networks (Luigi Berardi, Francesco Gino Ciliberti, Daniele Biagio Laucelli & Orazio Giustolisi)
- 14842 - Loop Breaking Strategy for Drinking Water Network Skeletonization (James Uber)
- 14748 - Data Driven Monitoring of Water Distribution Networks (Rohit Raphael, Sridharakumar Narasimhan)
- 14761 - Multi-objective insights and analysis on data driven classifiers for anomaly detection in water distribution systems (Elizabeth Pauline Carreño-Alvarado, Mayra Hernández Alba, Gilberto Reynoso Meza)

2.1.5. Session 1E. Room: Salón de Actos. Tuesday July 19, 2022, 10:30-12:15. Demand Modeling of Water Distribution Systems - I. Moderator: Steven Buchberger

- 14145 - TEmporal Scale Sigmoid Curve (TESIC): A tool to characterize short-term demand variability at water supply systems (Emilio Ruiz Gómez, Sarai Díaz García, Javier González Pérez)
- 14067 - Comparison between the Top-down and Bottom-up approach for the diffuse-dispersive phenomenon analysis (Stefania Piazza, Mirjam Blokker, Mariacrosetta Sambito & Gabriele Freni)
- 14088 - Using high-resolution data to test the robustness of an automated method for water end-use disaggregation and classification (Filippo Mazzoni, Mirjam Blokker, Stefano Alvisi & Marco Franchini)
- 14771 - Testing the Portability of Non-Intrusive Load Monitoring Algorithms to Water End-Use Disaggregation (Giovanni Francesco Santonastaso, Anna Di Mauro, Andrea Cominola & Armando Di Nardo)
- 14774 - pySIMDEUM - An open-source stochastic water demand end-use model in Python (David Bernhard Steffelbauer, Bram Hillebrand, Mirjam Blokker)
- 14903 - Water use in collective student housing (Lien De Backer, Laura De Jonge, Elisa Van Kenhove)

2.1.6. Session 1F. Room: Salón de Grados. Tuesday July 19, 2022, 10:30-12:15. Industry Track I - Water Quality.

Moderator: Donghwi Jung

- 14763 - Increasing Water Utility Resilience in the United States (Pacia Diaz)
- 14720 - Application of additive manufacturing for the improvement of chlorination performance in drinking water tanks, by dispensing hypochlorite at various points regulated from the data of the sensors of the tank itself (Sergi Grau Torrent, Borja Batlle Sánchez, Sergi Compte, Daniel Galera, Marc Peramiquel Castellà, Xavier Figuls Blanch, Rubèn López Farrés, Jofre Obradors Via, Albert Duran Sandoval & Xavier Amores Bravo)
- 14937 - HYDROGENIE: Intelligent Control Valve Pilot (Virginie Meugnier, Vicente Sansaloni, Joan Galtés)
- 14756 - Optimization Algorithms for Contamination Warning System Design for Water Distribution Network Security: A State-of-the-Art Review (Shweta Rathi)
- 14448 - Forecasting the Resilience of Integrated Urban Water Management: The Effect of Salt Water on an Infrastructure System in a Coastal Community (Pacia Diaz, Mark R. Hafen, Mark R. Hafen)
- 14069 - Analysis of Discolouration Customer Contacts to Assess Performance and Intervention Efficacy. (Dominic Michael Cook, Duncan McLeod, Joby Boxall & Stewart Husband)

2.2. Session 2. Tuesday July 19, 2022, 15:15-16:30

2.2.1. Session 2A. Room: A.1.06. Tuesday July 19, 2022, 15:15-16:30. Drainage and Sewer Systems - II. Moderator: Fulvio Boano

- 14105 - Graph based method for critical pipe analysis in urban drainage networks and the effect of loop degree (Aun Dastgir, Martin Oberascher, Sina Hesarkazazzi, Robert Sitzenfrei)
- 14738 - Infrastructure benchmarking for semi-real urban drainage networks (Robert Sitzenfrei, Sina Hesarkazazzi, Mohsen Hajibabaei)
- 14787 - A stochastic sewer model to predict pipe flows and pollutant loads in an urban drainage system (William Addison Atkinson, Albert Chen, Fayyaz Memon & Jan Hofman)
- 14699 - A Bayesian Generative Adversarial Networks to Generate Synthetic Time-Series Data, Application In Combined Sewer Flow Prediction (Amin Ebrahim Bakhshipour, Alireza Koochali, Ulrich Dittmer, Andreas Dengel, Ahmed Sheraz & Ali Haghighi)

2.2.2. Session 2B. Room A.1.07. Tuesday July 19, 2022, 15:15-16:30. Design of Water Distribution Systems - II. Moderator: Mario Castro-Gama

- 14098 - Pumping Station Design with an Analysis of Variability of Demand and Considering Techno-Economic and Environmental Criteria through the AHP Method (Christian Xavier Briceno, Pedro Luis Iglesias Rey, Francisco Xavier Martinez Solano & Enrico Creaco)
- 14779 - Why aren't surrogate reliability indices so reliable? Can they be improved? (Joaquim José de Oliveira Sousa, João Muranho, Marco Bonora & Mario Maiolo)
- 14132 - The Use of Resilience and Performance Metrics to Support Decision Making in Drinking Water Systems (Joana Carneiro, Dália Loureiro, Dídía Covas)

- 14739 - Methodology for analysis of the SDGs compliance in urban water systems. Implementation in case studies in the Valencian Community (Camila Andrea Garcia Rodriguez, Pilar Conejos Fuertes, Jaime Castillo Soria, Petra Amparo Lopéz Jiménez & Modesto Perez Sanchez)

2.2.3. Session 2C. Room: A.1.10. Tuesday July 19, 2022, 15:15-16:30. Water Quality in Water distribution systems - II. Moderator: Yves Filion

- 14181 - Disinfection Residual Behaviour within Drinking Water Distribution Systems (Jade Rogers, Katherine Fish, Vanessa Speight, Hunter Fairley, Graham Knowles & Joby Boxall)
- 14084 - The impact of drinking water network model spatial and temporal scale on hydraulic metrics indicating discolouration risk (Reinar Lokk, Mirjam Blokker, Joby Boxall, Michele Romano, Anna Provost & Stewart Husband)
- 14778 - Investigating water quality management in WDN using data modelling approaches (Francesco Gino Ciliberti, Laura Vanessa Enriquez, Daniele Biagio Laucelli, Juan Saldarriaga & Orazio Giustolisi)
- 14007 - Water Quality in Drinking Water Distribution Systems: A Whole-Systems Approach to Decision Making (Sally L Weston, Manuel Rodriguez, Sonja Behmel)

2.2.4. Session 2D. Room: A.1.11. Tuesday July 19, 2022, 15:15-16:30. Analysis and Modeling of Water Distribution Systems - II. Moderator: Orazio Giustolisi

- 14722 - Digitalization in small water utilities: the case of Pamplona, Colombia (Carlos Alexis Bonilla Granados, Bruno Brentan, Idel Montalvo Arango & Joaquín Izquierdo)
- 15007 - Building digital twins of water supply networks with QGISRed plugin for QGIS (Fernando Martínez Alzamora, Nestor Lerma Elvira)
- 14797 - Assessing the Performances and Transferability of Graph Neural Networks Metamodels for Water Distribution Systems (Roberto Bentivoglio, Bulat Kerimov, Jorge Alexander Garzon Diaz, Elvin Isufi, Franz Tscheikner-Gratl, David Bernhard Steffelbauer & Riccardo Taormina)
- 14760 - Valve Loss Curve Estimation Using Real-Time SCADA Data (SM Masud Rana, Gal Perelman, Elad Salomons & James G Uber)

2.2.5. Session 2E. Room: Salón de Actos. Tuesday July 19, 2022, 15:15-16:30. Demand Modeling of Water Distribution Systems - II. Moderator: Jochen Werner Deuerlein

- 14750 - Coupling Agent-based Modeling with Water Distribution System Models to Simulate Social Distancing and Water Infrastructure Performance during COVID-19 (Brent Vizanko, Leonid Kadinski, Avi Ostfeld, Emily Berglund & Christopher L Cummings)
- 14829 - Non-intrusive water usage classification considering limited training data (Pavlos Pavlou, Stelios G. Vrachimis, Demetrios G. Eliades & Marios M. Polycarpou)
- 14721 - Uncertainty analysis and model development for urban residential water consumption patterns (Qiang Xu, Jiaxin Zhang, Kuo Liu, Zhimin Qiang & Xin He)
- 14886 - Water consumption analysis during night hours of residential customers (Ariane Isabella Estrada Estrada, Francisco Arregui de la Cruz, Javier Soriano Olivares, Román Ponz Carcelén & David Torres Toro)

2.2.6. Session 2F. Room: Salón de Grados. Tuesday July 19, 2022, 15:15-16:30. Industry Track II - Asset Management.

Moderator: Paolo Vezza

- 14725 - PVC-O pipes the most efficient solution for the transport of water under pressure (Marcos Rincón Benito)
- 14726 - The Sanecor® system, a sustainable solution for sewerage networks (Edgar Llopis)
- 14004 - Post-treatment PFAS contamination of drinking water (Gopinathan R. Abhijith, Avi Ostfeld)
- 14042 - Providing a strategy plan for optimal sampling location to reduce the in effect duration of drinking water warning advisory (Reza Yousefian)

2.3. Session 3. Tuesday July 19, 2022, 17:00-18:00

2.3.1. Session 3A. Room: A.1.06. Tuesday July 19, 2022, 17:00-18:00. Drainage and Sewer Systems - III. Moderator:

Luigi Berardi

- 14158 - BiAcceptadoinetic and Artificial Intelligence Models for the Simulation of Nitrous Oxide Emissions from Wastewater Treatment Plants (Siddharth Seshan, Johann Poinapen, Jules B. van Lier & Zoran Kapelan)
- 14875 - Biofungus: fungus MBBR pilot plant on Murcia Este WWTP (E. Mena, A. Gadea, A. Monreal-Bernal, S. López-García, V. Garre, A. J. Lara-Guillén)
- 14247 - Roadmap towards Smart Wastewater Treatment Plants (Daniel Aguado García, Henri Haimi, Michela Mulas & Francesco Corona)
- 14249 - Metadata: a must for the digital transition of wastewater treatment plants (Daniel Aguado García, Frank Blumensaat, Juan Antonio Baeza, Kris Villez, M^a Victoria Ruano, Oscar Samuelsson, Queralt Plana & Janelcy Alferez)

2.3.2. Session 3B. Room: A.1.07. Tuesday July 19, 2022, 17:00-18:00. Risk Analysis in Water distribution systems.

Moderator: Robert Sitzenfrei

- 14135 - Advanced fire flow risk analysis using EPANET (Alexander Nicholas Sinske, George Adrian van Heerden, Altus Hugo de Klerk)
- 14830 - Water for firefighting: A comparative study across several cities (Adeshola Ayodeji llemobade)
- 14534 - Performance evaluation of buried uPVC pipes by numerical simulation of soil-pipe interaction (Milad Latifi, Ramiz Beig Zali, Raziye Farmani, Akbar Javadi & Suhayl Zulfiquar)
- 14766 - Analysis of PDA-based Water Distribution System Suspension Risk using statistical and machine learning method (Yoojin Oh, Haekeum Park, Jinseok Hyung, Taehyeon Kim, Kibum Kim & Jayong Koo)

2.3.3. Session 3C. Room: A.1.10. Tuesday July 19, 2022, 17:00-18:00. Water Quality in Water distribution systems - III.

Moderator: Joby Boxall

- 14802 - Optimization of reservoir treatment levels considering uncertainty in mixing at cross junctions in water distribution systems using Info-gap decision theory (Sriman Pankaj Boindala, G Jaykrishnan, Avi Ostfeld)

- 14016 - Characterizing the effects of water distribution system topology modifications on its dynamic behaviour through connectivity metrics (Valentina Marsili, Stefano Alvisi, Filomena Maietta, Caterina Capponi, Silvia Meniconi, Bruno Brunone & Marco Franchini)
- 14799 - PathoInvest: Pathogen Contamination Investigations during Emergencies (Sotirios Paraskevopoulos, Stelios Vrachimis, Marios Kyriakou, Pavlos Pavlou, Dimitris Kouzapas, George Milis, Patrick Smeets, Demetrios G. Eliades, Gertjan Medema, Marios Polycarpou, Christos Panayiotou)
- 14116 - Measuring drinking water temperature changes in a distribution network (Mirjam Blokker)

2.3.4. Session 3D. Room: A.1.11. Tuesday July 19, 2022, 17:00-18:00. Analysis and Modeling of Water Distribution Systems - III. Moderator: Joaquim José de Oliveira Sousa

- 14142 - Flow dynamics in a pipe containing uneven roughness elements (Katrin Kaur, Anatoli Vassiljev, Murel Truu, Ivar Annus & Nils Kändler)
- 14061 - Assessment of water distribution networks skeletonization methods based on stochastic supply and demand scenarios (Thomas Pirard, Sébastien Erpicum, Michel Piroton, Benjamin Dewals & Pierre Archambeau)
- 14168 - Hydraulic State Estimation: pilot implementation in a water distribution system (Emilio Ruiz Gómez, Sarai Díaz García, Javier González Pérez)
- 14054 - Using High-Order Algorithms for the Pressure-Driven Modeling of Water Distribution Networks (Enrico Creaco, Armando Di Nardo, Michele Iervolino, Giovanni Francesco Santonastaso)

2.3.5. Session 3E. Room: Salón de Actos. Tuesday July 19, 2022, 17:00-18:00. Leakage Analysis and Control - I. Moderator: Kobus van Zyl

- 14078 - Water Consumption variation in Latin America due to COVID-19 Pandemic (Catalina Ortiz, William Clavijo, Jürgen Mahlknecht & Juan Saldarriaga)
- 14107 - NRW Estimation and Localization in Water Distribution Networks via Hydraulic Model Calibration using 24/7 Continuously Monitoring Data (Alvin Wei Ze Chew, Zheng Yi Wu, Rony Kalfarisi, Meng Xue, Jocelyn Pok, Jianping Cai, Kah Cheong Lai, Sock Fang Hew, Jia Jie Wong)
- 14085 - Leak detection and location in a real water distribution network using a model-based technique (Bruno Ferreira, Nelson Carriço, Dídía Covas)
- 14153 - An Experimental Study On Early Leak Localization In Water Distribution Networks (Yannick Deleuze, Arley Nova Rincón, Yves-Marie Batany, Teodulo Abril, Damien Chenu & Nicolas Roux)

2.3.6. Session 3F. Room: Salón de Grados. Tuesday July 19, 2022, 17:00-18:00. Industry Track II - Design & Digitalization. Moderator: Bruno Brentan

- 14882 - An example to the new vision of network's digitalization (Pepe Chambó, Jorge Helmbrecht)
- 14140 - Robust design of water distribution networks considering different demand conditions and multiple objectives (Maria Cunha, Roberto Magini, Joao Marques)
- 14841 - Establishing a Distribution System Digital Twin at Nashville Metro Water Services – An Operator-Focused Design Approach (James Uber)
- 14159 - Improving multi-objective optimization method NSGA II of water distribution systems (Rahel Amare Kidanu, Maria Cunha, Elad Salomons & Avi Ostfeld)

2.4. Session 4. Wednesday July 20, 2022, 10:30-12:15

2.4.1. Session 4A. Room: A.1.06. Wednesday July 20, 2022, 10:30-12:15. Battle of Intermittent Water Supply - I. Moderator: F. Javier Martínez-Solano

- 14077 - A Phased Methodology for the Optimal Rehabilitation of a Network with Intermittent Supply of Water Based on Hydraulic Criteria (Juan Saldarriaga, Jessica Bohorquez, Camilo Salcedo, Alexander Garzón, Laura Enriquez, David Celeita, Juana Herrán, Andrés Ariza, María Alejandra González, Santiago Gómez, Laura Serje, Laura González Díaz, Danna Velásquez, Catalina Ortiz)"
- 14178 - Rehabilitation of existing intermittent water supply network under fund constrains using marginal increase in resilience to marginal increase in cost method (Dr. Rajesh Gupta, Satyam Rajesh Tiwari, Aniket Sharma, Prerna Pandey & Dr. Shilpa Dongre)
- 14096 - A Step Wise Algorithm for Converting Intermittent to Continuous Water Supply (Amirabbas Mottahedin, Amin Minaei, Robert Sitzenfrei & Enrico Creaco)
- 14719 - A genetic algorithm approach to rehabilitate an Intermittent Water Supply System (Brent Vizanko, Cade Karrenberg, Faisal Alghamdi, Jorge Pesantez, Morgan DiCarlo & Emily Berglund)
- 14028 - A multi-step optimization approach to rehabilitate a deteriorated and intermittent water distribution network (David Ayala-Cabrera, Mario Castro-Gama, Claudia Quintiliani, Sotudeh Hoseini-Ghafari)
- 14501 - Modeling the Final Solution using Multilevel Sector Analysis and Machine Learning for Optimizing Progressive Investments in a Distribution Water Network. (Xavier Torret, Yennifer Cufiño, Sergi Grau, Pablo Marques, Oscar Vegas, Diego Guedes, Edgar Fusté, Sergi Maspons & Ramon Perez)

2.4.2. Session 4B. Room: A.1.07. Wednesday July 20, 2022, 10:30-12:15. Energy Optimization of Water Networks - I. Moderator: Helena Ramos

- 14781 - Energy equations to analyse pressurized water transport systems (Roberto del Teso March, Elena Gómez Sellés, Elvira Estruch-Juan & Enrique Cabrera Marcet)
- 14773 - Energy diagnosis of pressurized water systems with the ENERGOS tool (Elena Gómez, Roberto del Teso, Enrique Cabrera, Elvira Estruch-Juan, Pascual Jose Maximino, Miguel Ortiz, Guillermo del Pozo & Carlos Marco)
- 15005 - Assessment of the energy cost of water stored in tanks by tracking the energy flows (Fernando Martínez Alzamora, Joan Carles Alonso Campos, Miguel Angel Jimenez Bello)
- 14843 - Real-time Operation of Drinking Water Network using Multi-objective Optimization for Pump Cost Minimization and Operation Reliability (SM Masud Rana, Dominic L Boccelli)
- 14823 - Search space reduction for pumping station design optimization problem through automatic identification of infeasible flow distributions (Jimmy H. Gutierrez-Bahamondes, Daniel Mora-Melia, Bastian Valdivia-Muñoz & Pedro L. Iglesias-Rey)
- 14154 - Water Distribution Network operation optimization: an industrial perspective (Marco Lauricella, Felix Lenders)

2.4.3. Session 4C. Room: A.1.10. Wednesday July 20, 2022, 10:30-12:15. Water Quality in Water distribution systems - IV. Moderator: Mirjam Blokker

- 14091 - Dual estimation of iron oxide deposition on drinking water PVC pipes using calibrated turbidity data and brightfield microscopy in a full-scale laboratory system (Artur Sass Braga, Yves Filion)
- 14093 - Model for fast deposition of fine iron oxide particles on PVC pipe mains during the passage of a suspended particle plume in a full-scale laboratory system (Artur Sass Braga, Yves Filion)
- 14133 - Aquarellus: a numerical tool to calculate accumulation of particulate matter in distribution systems (Joost van Summeren, Mark Morley, Jip van Steen, Amitosh Dash & Luuk de Waal)
- 14094 - The identification of variable shear strength of particles deposited on drinking water PVC pipes after the passage of a suspended particle plume in a full-scale laboratory system (Artur Sass Braga, Yves Filion)
- 14574 - Effect of swabbing cleaning method on biofilm communities of a drinking water distribution system in Madrid (Spain) (Carolina Calero Preciado, Emelina Ruth Rodríguez Ruiz, Manuel José Arias Guedón)
- 14141 - Discovering Differences in Iron and Manganese Behaviour in Service Reservoirs (Anastasia Doronina, Stewart Husband, Joby Boxall & Vanessa Speight)

2.4.4. Session 4D. Room: A.1.11. Wednesday July 20, 2022, 10:30-12:15. Analysis and Optimization of Water Distribution Networks. Moderator: Adeshola Ayodeji Ilemobade

- 14770 - Mass Balance Calibration of Water Distribution Networks: application to a real case study (Daniele Biagio Laucelli, Orazio Giustolisi, Francesco Gino Ciliberti & Luigi Berardi)
- 14176 - Advances in premise plumbing modeling (William Platten, Regan Murray, Juneseok Lee, Robert Janke, Terra Haxton, Walter Grayman, Jonathan Burkhardt, Steven Buchberger)
- 14784 - The Shape of Water Distribution Networks - Describing local structures of water networks via graphlet analysis (Bulat Kerimov, Franz Tscheikner-Gratl, Riccardo Taormina & David Steffelbauer)
- 14815 - A Nonlinear Model Predictive Control Framework for Dynamic Water Network Optimization (Ernesto Arandia, James Uber)
- 14267 - Optimal Design-for-Control of Water Distribution Networks via Convex Relaxation (Filippo Pecci, Ivan Stoianov, Avi Ostfeld)
- 14753 - Which flow and pressure constraints for sustainable operation of Water Distribution Systems? (Olivier Piller, Jochen Deuerlein, Sylvan Elhay & Angus Simpson)

2.4.5. Session 4E. Room: Salón de Actos. Wednesday July 20, 2022, 10:30-12:15. Leakage Analysis and Control - II. Moderator: Dídía Covas

- 14053 - Stochastic modelling of DMA leakage incorporating material-linked failures patterns (Soheila Beygi, Jakobus van Zyl)
- 14418 - Developing a comprehensive leak detection model through recognition, localization, and response management. (Brett Snider, Gareth Lewis, Albert Chen, Lydia Vamvakeridou-Lyroudia, Dragan Savic)

- 14749 - A methodology for single and double-leak location in pressurised Water Distribution Networks using flowrate-dependent pressure residuals vectors (Clara Maria Corzo, Leonardo Alfonso Segura, Gerald Corzo Perez, Iulian Mocanu & Dimitri Solomatine)
- 14857 - Experimental analysis for the losses assessment in water distribution systems (Giovanna Darvini, Luciano Soldini)
- 14056 - Multi-leak detection and isolation in water distribution network (Debora Alves, Joaquim Blesa, Eric Duviella & Lala Rajaoarisoa)
- 14073 - Leak detection based on graph signal processing of pressure data (Daniel Bezerra Barros, Carlo Giudicianni, Manuel Herrera, Gustavo Meirelles & Bruno Brentan)

2.4.6. Session 4F. Room: Salón de Grados. Wednesday July 20, 2022, 10:30-12:15. Industry Track IV - Operation of Water Networks. Moderator: Kevin E Lansey

- 14253 - Collective Intelligence: Human-In-The-Loop AI in Water Systems (James Cooper)
- 14057 - Comprehensive Study on Performance Comparison of Predictive Modeling Methods for Smart Water Grid Near Real-Time Decision-Making Support (Rony G Kalfarisi, Alvin Chew, Jianping Cai, Meng Xue, Jocelyn Pok & Zheng Yi Wu)
- 14058 - Automatic Training and Benchmarking on Smart Water Grid Anomaly Detection and Classification (Jocelyn Pok, Jianping Cai, Meng Xue, Rony Kalfarisi & Zheng Wu)
- 14059 - Improving Near Real-Time Anomaly Event Classification with Trend Change Detection for Smart Water Grid Operation Management (Meng Xue, Zheng Yi Wu, Alvin Wei Ze Chew, Jocelyn Pok, Jianping Cai & Rony Kalfarisi)
- 14187 - Technological evolution of the Telecontrol of Valencia (Jesús Pérez Chiva)
- 14810 - What do we learn about household water consumption from smart meters? (Marten Hutten, Yvonne Hassink, Mario Maessen)

2.5. Session 5. Wednesday July 20, 2022, 15:15-16:30

2.5.1. Session 5A. Room: A.1.06. Wednesday July 20, 2022, 15:15-16:30. Intermittent Supply of Water Distribution Networks - I. Moderator: Raziye Farmani

- 14136 - Data Driven Approach for Equitable Supply in Water Networks (Adhityan R, Varghese Kurian, Sridharakumar Narasimhan)
- 14740 - A Comparative Analysis of Intermittent Water Supply Models (Omar Abdelazeem, David Donald James Meyer)
- 14013 - A Model of Intermittent Water Supply Simulating the Inequitable Distribution of Water (Matthew Henry MacRorie, Sally Weston, Vanessa Speight, Robin Price & Richard Collins)
- 15006 - Modelling the real behaviour of domestic tanks and intermittent water supply systems with EPANET (Fernando Martínez Alzamora, Pilar Conejos Fuertes)

2.5.2. Session 5B. Room: A.1.07. Wednesday July 20, 2022, 15:15-16:30. Energy Optimization of Water Networks - I. Moderator: Riccardo Taormina

- 15003 - Development of a tool for the optimization and regulation of hydraulic microgeneration systems adapted to the demand and flow variations aimed at the clean energy recovery in water

supply networks (Melvin Alfonso Garcia Espinal, Modesto Pérez-Sánchez , Francisco Javier Sánchez-Romero , P. Amparo López Jiménez & Pilar Conejos Fuertes)

- 14071 - Maximisation of power in Pump As Turbines : Applying model predictive control as a way to maximise power (Nilki Aluthge Dona, Aonghus McNabola, Biswajit Basu)
- 14155 - Optimal charging station placement for autonomous robots in drinking water networks (Mario Castro-Gama, Yvonne Hassink-Mulder)
- 15474 - Including GHG emissions for water distribution network expansion and optimal pump scheduling (Swati Sirsant, Mohamed A. Hamouda, Mostafa F. Shaaban)

2.5.3. Session 5C. Room: A.1.10. Wednesday July 20, 2022, 15:15-16:30. Water Quality in Water distribution systems - V. Moderator: Stewart Husband

- 14741 - Profile sampling to detect dissolved lead in household drinking water (Amitosh Dash, Jip van Steen, Mirjam Blokker)
- 14055 - Sensitivity Analysis of Water Distribution Networks Deterioration in Hydraulic and Economic Parameters (Leandro Alves Evangelista, Gustavo Meirelles Lima, Bruno Melo Brentan)
- 14818 - Study on iron dispersion law and control measures of dead-end branch pipe (Jianxun Chen, Jinliang Gao, Wenyan Wu, Guanghui Wang, Qiang Ding, Shihua Qi & Bo Li)
- 14827 - Application of black-box models based on artificial intelligence for the prediction of chlorine and TTHMs in the trunk network of Bogotá (Laura Enriquez, Laura González & Juan Saldarriaga)

2.5.4. Session 5D. Room: A.1.11. Wednesday July 20, 2022, 15:15-16:30. Operation and Control of Water Distribution Networks - I. Moderator: Avi Ostfeld

- 14758 - Multi-objective controller tuning of pressure control in water distribution systems (Gilberto Reynoso Meza, Elizabeth Pauline Carreño-Alvarado)
- 14024 - Local control schemes for real-time optimization of variable speed pumps (Elad Salomons, Mashor Housh, Uri Shamir)
- 14161 - Flow ratio and pressure control in a low losses WDS – Analysis of dynamics (Bogumil Ulanicki, Philippe Beaujean, Juliaan Plancke & Bastien Leruth)
- 14164 - PRVs working in parallel configurations – Analysis of dynamics (Bogumil Ulanicki, Philippe Beaujean, Juliaan Plancke & Bastien Leruth)

2.5.5. Session 5E. Room: Salón de Actos. Wednesday July 20, 2022, 15:15-16:30. Leakage Analysis and Control - III. Moderator: David Bernhard Steffelbauer

- 14082 - Analysis of online pressure for resilience phase characterisation of leakages/burst events (Sotudeh Hoseini Ghafari, Jorge Francés-Chust, Olivier Piller & David Ayala-Cabrera)
- 14109 - Acoustic Data Analysis Framework for Near Real-Time Leakage Detection and Localization for Smart Water Grid (Alvin Wei Ze Chew, Zheng Yi Wu, Rony Kalfarisi, Meng Xue, Jocelyn Pok, Jianping Cai, Kah Cheong Lai, Sock Fang Hew, Jia Jie Wong)
- 14560 - Leak localisation method using a detailed hydraulic model combined with high resolution pressure sensors applied to a real network (Sergi Grau Torrent, Ramon Pérez Magrané, Xavier Torret Requena & David Casado Ruiz)

- 14751 - Iteratively tuning the regularisation parameter in an inverse method for localising leaks in water distribution networks (Yuanyang Liu, Ivan Stoianov, Filippo Pecci)

2.5.6. Session 5F. Room: Salón de Grados. Wednesday July 20, 2022, 15:15-16:30. Industry Track V - Demands in Water Distribution Networks. Moderator: James Uber

- 14464 - Prediction of Water Consumption Using Quantile Regression Neural Network for Burst Detection in Drinking Water Supply Network (Haochen Zhang)
- 14831 - Supervised machine learning models for leak detection in water distribution systems (Lochan Basnet, James Levis, Downey Brill, Ranji Ranjithan & Kumar Mahinthakumar)
- 14506 - South West Water Smart Metering Trial: An Industry / Academia Partnership (Gareth Lewis)
- 14185 - Integration of turbines in supply networks, a smart solution for drinking water in the city of Valencia (Mari Carmen Barrachina Gimeno)

2.6. Session 6. Wednesday July 20, 2022, 17:00-18:00

2.6.1. Session 6A. Room: A.1.06. Wednesday July 20, 2022, 17:00-18:00. Intermittent Supply of Water Distribution Networks - II . Moderator: Enrico Creaco

- 14111 - Modelling of Air Pocket Entrapment during Pipe Filling Events in Intermittent Water Supply Systems (Joao Ferreira, David Ferras, Didia Covas & Zoran Kapelan)
- 14044 - Optimal Operation in Sectorized Networks with Intermittent Water Distribution (Rui Gabriel Souza, Gustavo Meirelles, Bruno Brentan)
- 14173 - Effects of consumer patience on energy loss in intermittent water supply networks (Hamidreza Mohabbat, David D.J. Meyer)
- 14821 - Investigation of groundwater consumption to cope with the inadequate piped water supply in continuous and intermittent supply systems: A case study in Bangalore, India. (B.N Priyanka, Bharanidharan B, Sheetal Kumar KR, MS Mohan Kumar, VV Srinivas, Sanjana R Nibgoor & Kishore Y)

2.6.2. Session 6B. Room: A.1.07. Wednesday July 20, 2022, 17:00-18:00. Battle of the Leakage Detection and Isolation Methods (BattLeDIM, 2020). Moderator: Demetrios G. Eliades

- Special Session to present some of the results of the Battle of the Leakage Detection and Isolation Methods (BattLeDIM). This session should have been held at the Beijing Conference (2020). During the session there will be an introduction to the Battle statement and some of the participants will present their solutions.

2.6.3. Session 6C. Room: A.1.10. Wednesday July 20, 2022, 17:00-18:00. Water Quality in Water distribution systems - VI. Moderator: Vanessa Speight

- 14777 - Development of prediction model of ozone dosage and residual ozone concentration using machine learning methods in ozone process of drinking water treatment process (Jaeyoung Kwon, Jinseok Hyung, Taehyeon Kim, Haekuem Park, Jayong Koo)
- 14703 - Machine learning methodologies to predict possible water quality anomalies as a support tool for online monitoring of organic parameters (Leonid Kadinski)

- 14730 - Evaluation of physical and water quality indicators in aductors in hydraulic transient events (Mariele de Souza Parra Agostinho Agostinho, Danieli Mara Ferreira, Cristovão Vicente Scapulatempo Fernandes)
- 14614 - Interpretable machine learning-based corrosion rate prediction model of water pipes (Taehyeon Kim, Jinseok Hyung, Haekeum Park, Kibum Kim & Jayong Koo)

2.6.4. Session 6D. Room: A.1.11. Wednesday July 20, 2022, 17:00-18:00. Operation and Control of Water Distribution Networks - II. Moderator: Sarai Díaz García

- 15011 - Potential reduction of leakage volume by combining dynamic pressure management and energy recovery in Valencia (Alejandra Guarachi Quiñones, Francisco Javier Martínez Solano, Carmen Sánchez Briones & Andross Pérez Lleó)
- 14103 - An improved control strategy for high-pressure pumping irrigation systems (Ye Wang, Qi Zhao, Erik Weyer, Wenyan Wu, Angus Simpson & Ailsa Willis)
- 14835 - Teaching pipe and pump hydraulics: hands-on laboratory exercises using the Aqualibrium model (Kobus van Zyl, Colin N. Whittaker, Naser Mostashiri, Kelly Cokorudy, Zoe Martin, Santiago Carrillo Trivino, Claire Donald)

2.6.5. Session 6E. Room: Salón de Actos. Wednesday July 20, 2022, 17:00-18:00. Leakage Analysis and Control - IV. Moderator: P. Amparo López-Jiménez

- 14005 - Investigating an alternative to exhumed grey cast iron water pipes for small-scale fatigue tests (Edward D'Arcy Aston John, Joby Boxall, Richard Collins, Elisabeth Bowman & Luca Susmel)
- 14127 - Advancing towards semi-automatic labeling of GPR images to improve visualizations of pipes and leakage in water distribution networks using multi-agent systems and machine learning techniques (Gemma Stanton, David Ayala-Cabrera)
- 14124 - Machine-learning-based fault diagnosis of gate valves (Hyunjun Kim, Kwangjun Jung, Sumin Lee)
- 14814 - An innovative electrical approach for real-time monitoring of pumping systems focusing on fault diagnosis and operating efficiency (Jorge Estima, Francisco Rolo, Marco Ferreira)

2.6.6. Session 6F. Room: Salón de Grados. Wednesday July 20, 2022, 17:00-18:00. Industry Track VI - Leakage Control and Network Operation in Water Distribution Systems. Moderator: Pilar Conejos Fuertes

- 14131 - Performance assessment of leak localisation method for locating small leaks in water distribution networks (Martijn Bakker)
- 14177 - Fibre optic-based monitoring system for the detection of leaks in drinking water pipelines (Pablo Durán Zafrilla)
- 14653 - Mains burst and discolouration contacts in drinking water distribution systems (Manar Al-Saffar, Grigorios Kyriakos, Stewart Husband)
- 14146 - Benchmarking as a first step towards building decision making machine learning models in the water management sector. The Global Omnium case. (David Torres Toro)

2.7. Session 7. Thursday 21, 2022, 10:30-12:15

2.7.1. Session 7A. Room: A.1.06. Thursday 21, 2022, 10:30-12:15. Battle of Intermittent Water Supply - II. Moderator: Juan Saldarriaga

- 14075 - Five-years rehabilitation plan of a water distribution network (Giorgia Lucrezia Guarino, Luca Preite, Giulia Scaletti, Giacomo Ferrarese & Stefano Malvasi)
- 14175 - Multi-staged conversion from intermittent to continuous water supply (Dondu Sarisen, Faten Ayyash, Vasilis Koukoravas & Kondwani Simukonda)
- 14083 - Rehabilitating Intermittent Water Supply Systems Through A Multi-Objective Optimization Method Based On Hydraulic Simulations (Irene Marzola, Valentina Marsili, Filippo Mazzoni, Stefano Alvisi & Marco Franchini)
- 14513 - Optimal rehabilitation procedure for intermittent water supply systems (Ariele Zanfe, Rui Souza, Andrea Menapace, Bruno Brentan, Gustavo Meirelles, Idel Montalvo, Maurizio Righetti & Joaquin Izquierdo)
- 14705 - Multi-Staged Many-objective Optimization Approach to Rehabilitating a Deteriorated Water Distribution Network (Zilin Li, Xudong Zhang, Zheng Luo, Yi Wu, Qiuyuan Xu, Chao Zhang & Haixing Liu)
- 14805 - Battle of the intermittent water supply: a two-stage optimization approach through linear approximation and model aggregation (Greg Hendrickson, Meghna Thomas, Lina Sela)

2.7.2. Session 7B. Room: A.1.07. Thursday 21, 2022, 10:30-12:15. Asset Management. Moderator: Zoran Kapelan

- 14636 - Hydraulic and Co-located Pipe Criticalities in the Rehabilitation of Water Distribution Mains (Amin Minaei, Mohsen Hajibabaei, Enrico Creaco, Robert Sitzenfrei)
- 14792 - Criticality of isolation valves in water distribution networks (Richárd Wéber, Ákos Déllej, Tamás Huzsvár, Csaba Hős)
- 14813 - High resolution water pressure monitoring for the assessment of fatigue damage in water distribution pipes (Carlos Jara-Arriagada, Ivan Stoianov)
- 14755 - Important Factors For Water Main Break Prediction Across 13 Canadian Systems (Rebecca Dziedzic, Sadaf Gharaati)
- 14112 - A decision-making approach to assess and prioritise intervention solutions in water distribution systems (Marta Cabral, Dália Loureiro, Dídía Covas)
- 14775 - Designing advanced asset management for Water Distribution Networks: application to a real case study (Daniele Biagio Laucelli, Serena Spagnuolo, Antonio Rinaldi, Gianluca Perrone, Luigi Berardi & Orazio Giustolisi)

2.7.3. Session 7C. Room: A.1.10. Thursday 21, 2022, 10:30-12:15. Water Quality in Water distribution systems - VII. Moderator: Richard Collins

- 14014 - Big data to understand and estimate the risks of iron exceedance in drinking water distribution systems (Joby Boxall, Vanessa Speight, Grigorios Kyritsakas, Ehsan Kazemi, Stewart Husband & Katrina Flavell)
- 14838 - Identifying Cyber-Physical Attack Scenarios on Water Distribution Systems using Finite State Processes (Cade Karrenberg, Juan Benavides, Emily Berglund, Eunsuk Kang & John Baugh)

- 14780 - Utilizing machine learning in an agent-based modelling framework to optimize response to contamination events in water networks during a global pandemic (Leonid Kadinski, Brent Vizanko, Emily Berglund & Avi Ostfeld)
- 14793 - A Thorough Cybersecurity Dataset for Intrusion Detection in Smart Water Networks (Riccardo Taormina, Andrés F. Murillo, Nils Ole Tippenhauer & Stefano Galelli)
- 14169 - Modelling a comprehensive relation between water quality and leaching in the drinking water distribution network (Karel Antonie van Laarhoven, Alex Hocking, Martin Korevaar)
- 14125 - Machine-learning-based detection of water hammer events in water distribution networks (Hyunjun Kim, Kwangjun Jung, Sumin Lee)

2.7.4. Session 7D. Room: A.1.11. Thursday 21, 2022, 10:30-12:15. Sensor Placement and Sectorization. Moderator: Frances Pick

- 14562 - Development of a graph dynamic sectorization tool using QGIS/PostgreSQL to plan and operate water distribution networks (Xavier Torret Requena, Sergi Grau Torrent, Ramon Pérez Magrané & Enric Amat Miralles)
- 14869 - A Critical Review of Leakage Detection Strategies including Pressure and Water Quality Sensor Placement in Water Distribution Systems - Sole and Integrated approaches for leakage and contamination intrusion (Shweta Rathi)
- 14733 - Pressure sensor placement in water networks based on sensitivity matrix: a real instrumentation project plan (Joan van Eeckhout, Josep Cugueró, Ramon Pérez)
- 14063 - Optimal flow meters placement for uncovering the water network flow distribution (Mashor Housh, Elad Salomons, Uri Shamir & Ilan Newman)
- 14038 - Sensor Placement in Water Distribution Networks Using Centrality Guided Multiobjective Optimization (Michael Emmerich, Jacob Lan, Iryna Yevseyeva, Robert Sitzenfrei, Kegong Diao)
- 14828 - Optimal Location of Multiple Confirmatory Sampling Locations in Water Supply Networks in Real-Time Using Information Theory (Camilo Salcedo, Avi Ostfeld, Dominic L. Boccelli)

2.7.5. Session 7E. Room: Salón de Actos. Thursday 21, 2022, 10:30-12:15. Leakage Analysis and Control - V. Moderator: Pilar Conejos Fuertes

- 14152 - Multidimensional data generation in water distribution systems using the Cycle-GAN (Sehyeong Kim, Donghwi Jung)
- 14803 - Combining Hydraulic Knowledge with Deep Learning for Water Distribution Burst Detection (Sanghoon Jun, Kevin E Lansey)
- 14035 - Searching for a universal water loss indicator using correlation and frontier analysis (Suvi Ahopelto, Riku Vahala)
- 14812 - Quantification of Leak Discharge-pressure Relationship Through Directly Measurement of Leak Area for Linear Elastic Deforming Pipes (Yuanzhe Li, Jinliang Gao, Jianxun Chen, Hangwei Zheng, Guosheng Sun & Chengzhi Zheng)
- 14817 - Leakage control of water distribution system by drop-restore pressure based on viscoelastic mechanism (Jinliang Gao, Jianxun Chen, Wenyan Wu, Liqun Deng, Kunyi Li & Yi Yuan)

**2.7.6. Session 7F. Room: Salón de Grados. Thursday 21, 2022, 10:30-12:15. Smart Solutions for Water Systems - I .
Moderator: Miguel Angel Jimenez Bello**

- 14441 - Long-Term Transitioning of Water Distribution Systems: ERC Water-Futures Project (Dragan Savic, Marios Polycarpou, Phoebe Koundouri & Barbara Hammer)
- 14419 - Towards digital twins of city-scale waterways using sensors, IoT and open access data (Chris Sweetapple, Peter Melville-Shreeve)
- 14095 - W-NET4.0 – Integrated Platform and Digital Twin for Small and Medium Sized Water Supply Utilities (Jochen Werner Deuerlein, Thomas Bernard, Naga Mamatha Gonuguntla, Jorge Thomas, Armin Canzler, Heiko Keifenheim, Susanne Wiese, Ruediger Hoeche, Joachim Rapp & Salomé Parra)
- 14126 - Augmenting Digital Twin Intelligence for Smart Water Grid Anomaly Detection and Classification (Zheng Yi Wu, Alvin Chew, Xue Meng, Jianping Cai, Jocelyn PAcceptado, Rony Kalfaris, Kah Cheong Lai, Sock Fang Hew & Jia Jie Wong)
- 14580 - A Participatory Hybrid Decision Support Framework for Industrial Symbiosis: The Symbiotic Water Cycle Framework (F-SWC) (Otto Chen, Barry Evans, Mehdi Khoury, Lydia Vamvakeridou-Lyroudia, Nav Mustafee, Albert S. Chen, Slobodan Djordjević & Dragan Savić)
- 14788 - IoT.H2O - Supervision and Control for Water Systems based on Low-Cost Hardware and Open-Source Software (Harald Roclawski, Laura Sterle, Martin Böhle, Thomas Krätzig)

2.8. Session 8. Thursday July 21, 2022, 15:15-16:30

**2.8.1. Session 8A. Room: A.1.06. Thursday July 21, 2022, 15:15-16:30. Battle of Intermittent Water Supply - III .
Moderator: Stefano Alvisi**

- 14837 - Battle Intermittent Network (Mayra Hernández Alba, Elizabeth Pauline Carreño-Alvarado, Gilberto Reynoso-Meza)
- 14820 - Multi-objective optimal coupled engineering judgement for the Battle of Intermittent Water Supply (Jinliang Gao, Jianxun Chen, Bowen Duan, Kunyi Li, Zichuan Wang & Qidong Que)
- 14172 - Optimizing Rehabilitation Strategies for a Deteriorated Water Distribution System Providing Intermittent Supply Using a Heuristic Technique (Gal Perelman, Lu Xing, Mashor Housh, Venu Kandiah, Barak Fishbain & Ehsan Shafiee)
- 14148 - A payoff based solution for the BIWS challenge (Tamás Huzsvár, Richárd Wéber, Csaba Hős)

2.8.2. Session 8B. Room: A.1.07. Thursday July 21, 2022, 15:15-16:30.

- No scheduled activities in this room at this time.

2.8.3. Session 8C. Room: A.1.10. Thursday July 21, 2022, 15:15-16:30. Hydraulic Transients in Water Distribution Systems . Moderator: Lina Sela

- 14782 - Unsteady Friction Modeling Technique for Lagrangian Approaches in Transient Simulations (Mohamad Zeidan, Avi Ostfeld)
- 14819 - Analysis of friction models during simulations of filling processes in single pipelines (Vicente S. Fuertes-Miquel, Óscar E. Coronado-Hernández, Mohsen Besharat & Pedro L. Iglesias-Rey)

- 15002 - Energy Analysis of Transient Flow in Viscoelastic Pipeline Based on Quasi-2D Model (YueBin Wu, YaNan Zhao, Ying Xu)
- 14696 - Abnormality Identification Scheme for a Heterogeneous Pipenetwork System (Sanghyun Kim)

2.8.4. Session 8D. Room: A.1.11. Thursday July 21, 2022, 15:15-16:30. Water Distribution Network Planning . Moderator: Miguel Angel Jimenez Bello

- 14742 - Roadmap Drinking Water Distribution: an inventory of the challenges of the Dutch Water companies and research needs towards a future proof water supply (Mirjam Blokker, Karel van Laarhoven, Petra Holzhaus, Jan Vreeburg)
- 14768 - Efficiency analysis and evaluation model development of water distribution system rebuilding project using DEA method (Haekeum Park, Kibum Kim, Jinseok Hyung, Taehyeon Kim & Jayong Koo)
- 14752 - Determination of the cost of extraction and sale price of water for drinking use: a case study (M^a Magdalena Sánchez Astello, L.A. Bravo Anaya)
- 14118 - Small community water supplies in the Isiolo County, Kenya (Paolo Vezza, Roberto Arnesano, Fulvio Boano & Andrea Bessone)

2.8.5. Session 8E. Room: Salón de Actos. Thursday July 21, 2022, 15:15-16:30. Wastewater and Water Treatment Plants. Moderator: P. Amparo López-Jiménez

- 14200 - Estimation of the spatial distribution of substances in an Anaerobic Digestion Tanks with CFD (Soroush Dabiri, Prashant Kumar, Wolfgang Rauch)
- 14736 - Introducing CHAD - an ADM1 solver for direct linking to Lagrangian CFD software (Prashant Kumar, Zhenghao Yan, Wolfgang Rauch)
- 14702 - Sustainable wastewater treatment solutions for water-smart circular economy (Daniel Aguado García, Henri Haimi, Ana Mikola, Ana Soares & Ulf Jeppsson)
- 14549 - Modelling wastewater treatment processes in a sequential batch reactor using deep learning methodology (Anjana G Rajakumar, Vinoth Kumar, Rucha Vaidya, M S Mohan Kumar & Lakshminarayana Rao)

2.8.6. Session 8F. Room: Salón de Grados. Thursday July 21, 2022, 15:15-16:30. Smart Solutions for Water Systems - II. Moderator: Dragan Savic

- 14191 - Survey Exploring Customer Complaint Management and Smart Water Technology Adoption Across U.S. Water Systems (Morgan DiCarlo, Emily Zechman Berglund, Nikhil Kaza, Andrew Grieshop, Adam Behr & Luke Shealy)
- 14800 - Data-driven modeling of green wall water demand - Project Meadow (Michael Pointl, Bernhard Pucher, Daniela Fuchs-Hanusch)
- 14833 - Water distribution network disruptive events. Generation and exploration of an incident hub to increase the network preparedness (David Ayala-Cabrera, Jorge Francés-Chust, Sotudeh Hoseini-Ghafari, Gemma Stanton & Joaquín Izquierdo)
- 14062 - Smart water applications vs information and communication technologies – an integrative selection framework (Martin Oberascher, Wolfgang Rauch, Robert Sitzenfrei)



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