12th International Conference on Computing and Control for the Water Industry

(CCWI 2013)

Procedia Engineering Volume 70

Perugia, Italy
2 – 4 September 2013

Editors:

B. Brunone
O. Giustolisi

ISBN: 978-1-63266-557-7

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

http://www.elsevierpublishingsolutions.com/contact.asp

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Preface 1
B. Brunone
Optimization and Reliability Assessment of Water Distribution Networks Incorporating Demand Balancing Tanks 4
M. Abunada
Spatial Analysis of the Groundwater Quality in the Peshawar District, Pakistan 14
S. Adnan, J. Iqbal
Early Warning Systems to Predict Temperature in the Drinking Water Distribution Network 23
C. Agudelo-Vera, M. Blokker, I. Pieterse-Quirijns
Water Distribution Network's Modeling and Calibration. A Case Study based on Scarce Inventory Data 31
Z. Alves, J. Muranho, T. Albuquerque, A. Ferreira
A Procedure for the Design of District Metered Areas in Water Distribution Systems 41
A. Alvisi, M. Franchini
A Procedure for Spatial Aggregation of Synthetic Water Demand Time Series 51
S. Alvisi, N. Ansaloni, M. Franchini
A New Type of Risk Map for Municipal Sewerage Systems 61
A. Anton, C. Cosoiu, A. Georgescu
Pumping Stations: Solving Algorithm with Inverse Functions 67
A. Anton, A. Aldea
Incorporating Multi-event and Multi-site Data in the Calibration of SWMM 75
T. Shinma, L. Reis
Detecting Pipe Bursts Using Heuristic and CUSUM Methods 85
M. Bakker, D. Jung, J. Vreeburg, M. Van De Roer, K. Lansey, L. Rietveld
Improving the Performance of Water Demand Forecasting Models by Using Weather Input 93
M. Bakker, H. Duist, K. Schagen, J. Vreeburg, L. Rietveld
Concurrent Pump Scheduling and Storage Level Optimization Using Meta-models and Evolutionary Algorithms 103
M. Behandish, Z. Wu
Urban Water System Metabolism Assessment Using WaterMet^2 Model 113
K. Behzadian, Z. Kapelan, G. Venkatesh, H. Brattebo, S. Saegrov, E. Rozos, C. Makropoulos, R. Ugarelli, J. Milina, L. Hem
Control-volume Method for Extralarge Network Hydraulic Analysis 123
O. Belova, A. Skibin, V. Volkov
Mooring Control of Semi-submersible Structures for Wind Turbines 132
G. Benassai, A. Campanile, V. Piscopo, A. Scamardella
Accounting for Local Water Storages in Assessing WDN Supply Capacity 142
L. Berardi, D. Laucelli, O. Giustolisi
Energy Saving and Leakage Control in Water Distribution Networks: A Joint Research Project between Italy and China 152
L. Berardi, S. Liu, D. Laucelli, S. Xu, P. Xu, W. Zeng, O. Giustolisi
Condition Monitoring for Early Failure Detection. Frognerparken Pumping Station as Case Study 162
S. Berge, B. Lund, R. Ugarelli
Residual Chlorine in the Extremities of the Drinking Water Distribution System: The Influence of Stochastic Water Demands 172
M. Blokker, J. Vreeburg, V. Speight
Energy Efficiency Optimization in Water Distribution Systems 181
A. Bolognesi, C. Bragalli, C. Lenzi, S. Artina
Model based Investigation of Transport Phenomena in Water Distribution Networks for Contamination Scenarios 191
M. Braun, T. Bernard, H. Ung, O. Piller, D. Gilbert
The Characterization of Milan WDS by Pumping Switching off: Field Test Assesment 201
B. Brunone, S. Meniconi, M. Ferrante, C. Carrettini, C. Chiesa, C. Capponi, D. Segalini
Towards an Energy Labelling of Pressurized Water Networks 209
E. Cabrera, E. Cabrera Jr., R. Cobacho, J. Soriano

Selecting Time Scale Resolution to Evaluate Water Saving and Retention Potential of Rainwater Harvesting Tanks 218
A. Campisano, C. Modica
A Graph based Analysis of Leak Localization in Urban Water Networks 228
A. Candelieri, D. Conti, F. Archetti
Methodology for the Identification of Apparent Losses in Water Distribution Networks 238
J. Rios, R. Santos-Tellez, P. Rodriguez, E. Leyva, V. Martinez
Real Data Analysis and Efficiency of the TEA Mantova Casale (Italy) Variable-speed Pumping Station 248
C. Capponi, M. Ferrante, M. Pedroni, B. Brunone, S. Meniconi, M. Zaghini, F. Leoni
Storm Tracking based on Rain Gauges for Flooding Control in Urban Areas 256
M. Carbone, G. Garofalo, G. Tomei, P. Piro
A Conceptual Model for Predicting Hydraulic Behaviour of a Green Roof 266
M. Carbone, G. Garofalo, G. Nigro, P. Piro
Energy Recovery in Water Systems by PATs: A Comparisons among the Different Installation Schemes 275
A. Carravetta, O. Fecarotta, G. Giudice, H. Ramos
PAT Efficiency Variation with Design Parameters 285
A. Carravetta, O. Fecarotta, R. Martino, L. Antipodi
Multi-criteria Analysis for the Selection of the Best Energy Efficient Option in Urban Water Systems 292
N. Carrico, F. Goncalves, D. Covas, M. Almeida, H. Alegre
Predicting the Leakage Exponents of Elastically Deforming Cracks in Pipes 302
A. Cassa, J. Zyl
Tsunami Early Warning System based on Real-time Measurements of Hydro-acoustic Waves 311
C. Cecioni, G. Bellotti, A. Romano, A. Abdolali, P. Sammarco, L. Franco
Numerical Modeling of Atmospheric Water Content and Probability Evaluation. Part I 321
P. Cerlini, F. Cotana, F. Rossi, F. Asdrubali
Numerical Modeling of Atmospheric Water Content and Probability Evaluation. Part II 330
P. Cerlini, F. Cotana, F. Rossi, F. Asdrubali
Demand Forecasting for Water Distribution Systems 339
J. Chen, D. Boccelli
Using a Systematic, Multi-criteria Decision Support Framework to Evaluate Sustainable Drainage Designs 343
J. Chow, D. Savic, D. Fortune, Z. Kapelan, N. Mebrate
A Broad-crested Weir Boundary Condition in Finite Volume Shallow-water Numerical Models 353
L. Cozzolino, R. Morte, L. Cimorelli, C. Covelli, D. Pianese
Evaluation of an "Off the Shelf" Automated Chemical Phosphorus Removal System 363
K. Craig, R. Minnema, B. Dabkowski, M. Gironi
Low Level Hybrid Procedure for the Multi-objective Design of Water Distribution Networks 369
E. Creaco, M. Franchini
Comparison between Entropy and Resilience as Indirect Measures of Reliability in the Framework of Water Distribution Network Design 379
E. Creaco, A. Fortunato, M. Franchini, M. Mazzola
URBFEP Model for Basin Scale Simulation of Urban Floods Constrained by Sewerage's Size Limitations 389
S. Croci, A. Paoletti, P. Tabellini
Using Artificial Neural Network Models to Assess Water Quality in Water Distribution Networks 399
G. Cordoba, L. Tuhovcak, M. Taus
ANN Model to Predict the Influence of Chemical and Biological Parameters on Iron and Manganese Accumulation 409
E. Danso-Amoako, T. Prasad
Model Discrimination in Water Distribution Systems 419
G. Darvini
Landslide Tsunami: Physical Modeling for the Implementation of Tsunami Early Warning Systems in the Mediterranean Sea 429
P. Girolamo, M. Risio, A. Romano, M. Molfetta
Energy Recovery in Water Distribution Networks. Implementation of Pumps as Turbine in a Dynamic Numerical Model 439
M. Marchis, C. Fontanazza, G. Freni, A. Messineo, B. Milici, E. Napoli, V. Notaro, V. Puleo, A. Scopa
Optimal Design of District Metered Areas in Water Distribution Networks 449
F. Paola, N. Fontana, E. Galdiero, M. Giugni, G. Uberti, M. Vitaletti

Management System for Improving the Efficiency of Use Water Systems Water Supply 458
E. Souza, M. Silva
Influence of Hourly Water Consumption in Model Calibration for Leakage Detection in a WDS 467
S. Debiasi, C. Bort, A. Bosoni, P. Bertola, M. Righetti
Finding Economic Optimality in Leakage Reduction: A Cost-simulation Approach for Complex Urban Supply Systems 477
D. Deidda, G. Sechi, R. Zucca
Uncertainties in Hydraulic Transient Modelling in Raising Pipe Systems: Laboratory Case Studies 487
J. Delgado, N. Martins, D. Covas
Flushing Planner: A Tool for Planning and Optimization of Unidirectional Flushing 497
J. Deuerlein, A. Simpson, A. Korth
Effect of Data Uncertainty on Trihalomethanes Prediction in Water Supply Systems Using Kinetic Models 507
C. Cristo, A. Leopardi, G. Marinis
A District Sectorization for Water Network Protection from Intentional Contamination 515
A. Nardo, M. Natale, D. Musmarra, G. Santonastaso, V. Tzatchkov, V. Alcocer-Yamanaka
Ant Algorithm for Smart Water Network Partitioning 525
A. Nardo, M. Natale, R. Greco, G. Santonastaso
Best Practices Protocol for Drinking Water Supply Contamination Emergencies 535
P. Palma, E. Romano, A. Corazza, A. Duro, F. Campopiano, G. Vacca, E. Preziosi
Algorithms for Automatic, Real-time Tsunami Detection in Wind-wave Measurements: Using Strategies and Practical Aspects 545
M. Risio, G. Beltrami
Integration of Modelling and Monitoring to Optimize Network Control: Two Case Studies from Lisbon 555
N. Dias, N. Ferreira, A. Donnelly
Complementary Use of the WEAP Model to Underpin the Development of SEEAW Physical Water Use and Supply Tables 563
G. Dimova, E. Tzanov, P. Ninov, I. Ribarova, M. Kossida
Transient Wave-blockage Interaction in Pressurized Water Pipelines 573
H. Duan, P. Lee, M. Ghidaoui
Integrating Data for Water Demand Management 583
R. Dziedzic, B. Karney
The Effect of Demand Uncertainty on Transient Propagation in Water Distribution Systems 592
J. Edwards
Sensor Placement in Water Distribution Systems Using the S-PLACE Toolkit 602
D. Eliades, M. Kyriakou, M. Polycarpou
Use of On-line Water Quality Monitoring Data to Predict Bacteriological Failures 612
K. Ellis, S. Mounce, B. Ryan, M. Templeton, C. Biggs
Computing a Global Performance Index by Fuzzy Set Approach 622
R. Ermini, R. Ataoui
ICT for Efficient Water Resources Management: The ICeWater Energy Management and Control Approach 633
M. Fantozzi, I. Popescu, T. Farnham, F. Archetti, P. Mogre, E. Tsouchnika, C. Chiesa, A. Tsertou, M. Gama, M. Bimpas
A Pipe Network Simulation Model with Dynamic Transition between Free Surface and Pressurized Flow 641
J. Fernández-Pato, P. García-Navarro
The Leak Law: From Local to Global Scale 651
M. Ferrante, B. Brunone, S. Meniconi, C. Capponi, C. Massari
Identification of Leakages by Calibration of WDS Models 660
A. Morosini, P. Veltri, F. Costanzo, D. Savic
Experimental Proof of Contaminant Ingress into a Leaking Pipe During a Transient Event 668
S. Fox, W. Shepherd, R. Collins, J. Boxall
Optimized Control for Water Utilities 678
P. Fracasso, F. Barnes, A. Costa
Feature Extraction in Pressure Signals for Leak Detection in Water Networks 688
M. Gamboa-Medina, L. Reis, R. Guido
Leakage Control of Multi-source Water Distribution System by Optimal Pump Schedule 698
J. Gao, S. Qi, W. Wu, A. Han, C. Chen, T. Ruan
Numerical Model of a District Water Distribution System in Bucharest 707
A. Georgescu, S. Perju, S. Georgescu, A. Anton

Application of HBMOA to Pumping Stations Scheduling for a Water Distribution Network with Multiple Tanks 715
S. Georgescu
Contribution of Numerical Modeling to a Drinking Water Production Plan 724
A. Giunti, M. Giannetti, B. Sani, G. Vincenti, M. Bellatalla
Supporting Decision on Energy vs. Asset Cost Optimization in Drinking Water Distribution Networks 734
O. Giustolisi, L. Berardi, D. Laucelli
Influence of Future Water Demand Patterns on the District Metered Areas Design and Benefits Yielded by Pressure Management 744
R. Gomes, J. Sousa, A. Marques
Comprehensive and Efficient Sectorization of Distribution Networks 753
P. Gomez, F. Cubillo, F. Martin
Modelling of Coastal Infrastructure and Delta River Interaction on Ionic Lucanian Littoral 763
M. Greco, G. Martino
Manning's Roughness through the Entropy Parameter for Steady Open Channel Flows in Low Submergence 773
M. Greco, D. Mirauda, A. Plantamura
Transient Source Localization Methodology and Laboratory Validation 781
W. Hampson, R. Collins, S. Beck, J. Boxall
On-line Learning of Predictive Kernel Models for Urban Water Demand in a Smart City 791
M. Herrera, J. Izquierdo, R. Perez-Garcia, D. Ayala-Cabrera
Quasi-real Time Modeling for Security of a Drinking Water Distribution Network 800
U. Herve, O. Piller, G. Denis
Biodegradation of Municipal Wastewater with Local and Commercial Bacteria 810
R. Hesnawi, K. Dahmani, A. Al-Swayah, S. Mohamed, S. Mohammed
Estimating the Payback Period of In-line Micro Turbines with Analytical Probabilistic Models 815
C. Heysel, Y. Filion
InfraSense: A Distributed System for the Continuous Analysis of Hydraulic Transients 823
A. Hoskins, I. Stoianov
Modelling and Flow Conditioning to Manage Discolouration in Trunk Mains 833
S. Husband, J. Mistry, J. Boxall
Real-time Data Assimilation in Urban Rainfall-runoff Models 843
C. Hutton, Z. Kapelan, L. Vamvakeridou-Lyroudia, D. Savic
Decentralized Water Reuse: Regional Water Supply System Resilience Benefits 853
H. Hwang, A. Forrester, K. Lansey
Improvement of Fire Hydrant Design to Enhance Water Main Flushing 857
I. Hyun, S. Cheon, D. Kim, D. Seck, S. Choi
Mining Solution Spaces for Decision Making in Water Distribution Systems 864
J. Izquierdo, I. Montalvo, R. Pérez-García, E. Campbell
Security Checklists: A Compliance Alibi, or a Useful Tool for Water Network Operators? 872
M. Jaatun, J. Røstum, S. Petersen, R. Ugarelli
Smart Energy and Water Meter: A Novel Vision to Groundwater Monitoring and Management 877
H. Jahromi, M. Hamedani, S. Dolatabadi, P. Abbasi
Integrated Mathematical Model of a MBR Reactor Including Biopolymer Kinetics and Membrane Fouling 882
T. Janus
Research on Optimal Operation Method of Large Scale Urban Water Distribution System 892
X. Jin, W. Wu
Burst Detection in Water Distribution System Using the Extended Kalman Filter 902
D. Jung, K. Lansey
Author Index