

## Professor John Bridgeman BEng, MSc, PhD, CEng, CSci, FICE, FCIWEM

Professor of Environmental Engineering  
Director of Research and Knowledge Transfer, College of Engineering and Physical Sciences

[School of Civil Engineering \(/schools/civil-engineering/index.aspx\)](/schools/civil-engineering/index.aspx)

### Contact details

**Telephone** +44 (0) 121 414 5145 (tel:+44 121 414 5145)

**Fax** +44 (0) 121 414 3675

**Email** [j.bridgeman@bham.ac.uk](mailto:j.bridgeman@bham.ac.uk) (mailto:j.bridgeman@bham.ac.uk)

School of Civil Engineering  
Civil and Mechanical Engineering Building  
University of Birmingham  
Edgbaston  
Birmingham  
B15 2TT  
UK



### About

John Bridgeman is Professor of Environmental Engineering and Director of Research and Knowledge Transfer in the College of Engineering and Physical Sciences. Prior to his appointment at Birmingham in 2005, John spent 15 years working in the water industry on planning, feasibility and detailed process and hydraulic design of water and wastewater treatment systems.

He now delivers lectures and workshops at postgraduate and undergraduate levels on topics associated with water treatment processes and water quality, hydraulics, numerical modelling and asset management, and is an active researcher in these fields.

### Qualifications

- FICE 2013
- PhD in Water Chemistry and Fluid Dynamics, 2007
- CSci, 2005
- FCIWEM, 2004
- MSc in Water and Wastewater Technology, 2000
- MCIWEM, 1995
- MICE, 1994
- CEng, 1994
- BEng in Civil Engineering, 1989

### Biography

John Bridgeman joined the academic staff at the University of Birmingham in 2005 following a 15 year career in the water industry. Since then he has been actively involved all aspects of academia including research, teaching, administration, conference organisation and technology transfer, and has developed an international profile for his contributions to research in water management and, in particular, the areas of numerical modelling and water quality assessment.

He has secured research grant funding from the Engineering and Physical Sciences Research Council (EPSRC), the Natural Environment Research Council (NERC), the Environment Agency, the Institution of Civil Engineers (ICE), as well as fully funded industrial research contracts from a range of industrial organisations. In addition John has undertaken a range of consultancy contracts for clients such as Yorkshire Water, Severn Trent Water, Scottish Water, Mott Macdonald and Safe Training Systems.

John has undertaken a wide range of external activities and appointments. These include invitations to provide Keynote lectures at high quality international conferences (e.g. 13th International Conference on Civil, Structural and Environmental Engineering Computing, Chania, Crete, 2011; 8th International Symposium on Water Supply Technology, Kobe, Japan, 2009; Annual Conference of the Operational Research Society, York, UK, 2008; International Water Association Particle Separation, Toulouse, France, 2007). He is Editor-In-Chief of the Water and Environment Journal, and an Editor of Water Asset Management International.

John is a Chartered Civil Engineer and a Chartered Scientist. He is a Vice Chair of the ICE's Expert Water Panel, Secretary of the International Water Association (IWA) Specialist Group on Design Operation and Maintenance of Drinking Water Treatment Plants and a Committee Member of the IWA Specialist Group on Disinfection.

### Teaching

#### Teaching Programmes

##### Civil Engineering BEng / MEng

- Floods and River Systems
- Water Management

##### Water Resources Technology and Management MSc

- Water and Wastewater Treatment
- Water and Wastewater Design
- Groundwater
- Research Skills
- Research Project

## Postgraduate supervision

John is interested in supervising doctoral researchers in the following areas:

- fluid mechanics and computational modelling
- water quality, water and wastewater treatment
- infrastructure asset management

If you are interesting in studying any of these subject areas please contact John on the contact details above.

## Research

### RESEARCH THEMES

Water quality, water and wastewater treatment, numerical and computational modelling, infrastructure asset management

### RESEARCH ACTIVITY

#### 1. Water Quality, Water and Wastewater Treatment

Potable water treatment and supply, natural organic matter characterisation, disinfection, disinfection by-product formation and the links to health. Use of fluorescence spectroscopy to assess water and wastewater treatment works performance and water quality in distribution systems, and to assess water quality in areas of poor sanitation and disaster relief.

#### 2. Numerical and computational modelling

Computational fluid dynamics (CFD) modelling of water and wastewater treatment processes, including raw water storage, flocculation, service reservoir disinfection and digester mixing.

Development of a methodology and software tool to minimise operational cost of water treatment according to performance characteristics, raw water input and risk acceptance, using a genetic algorithm and Monte Carlo based simulation.

Coupled CFD / discrete element models (DEM) and coupled lattice Boltzmann / DEM to solve the complex fluid flow and fluidization processes to examine the leakage of flow from buried pipe networks.

Physical and numerical modelling of turbulent flow structure on boundary shear stress distributions in homogeneously roughened channels.

#### 3. Infrastructure Asset Management and Sustainability

Assessment of historical approaches to design and uncertainty, and influences on current approaches to design in terms of sustainable infrastructure development. Integrated modelling of infrastructure and serviceability indicators for the development of an optimum capital maintenance strategy.

Determination of future extreme multi-seasonal meteorological drought events with the use of a stochastic weather generator and modelling the consequential water resource impacts.

## Other activities

- External Examiner: PhD - Loughborough University, 2013; National University of Ireland (Galway), 2012; Cranfield University, 2012; Cardiff University School of Engineering, 2010 and 2011; University of Sheffield, Civil and Environmental Engineering, 2010 and 2012; MSc by Research – Cranfield University, 2009 and 2013
- Editor-in-Chief, Water and Environment Journal
- EPSRC College Member
- Vice Chair ICE Water Expert Panel

## Publications

Harris, C.N.H, Quinn, A.D. and Bridgeman, J., 2013, "Quantification of uncertainty sources in a probabilistic climate change assessment of future water shortages", *Climatic Change*, doi:10.1007/s10584-013-0871-8.

Sindall, R., Bridgeman, J. and Carliell-Marquet, C.M., 2013, Velocity gradient as a tool to characterize the link between mixing and biogas production in anaerobic waste digesters, *Water Science and Technology*, 67.12, 2800-2806.

Bridgeman, J., Baker, A., Carliell-Marquet, C.M. and Carstea, E., Determination of changes in wastewater quality through a treatment works using fluorescence spectroscopy, *Environmental Technology*, doi:10.1080/09593330.2013.803131.

Jesson, M., Sterling, M. and Bridgeman, J., 2013, Modelling flow in a heterogeneous open channel, *J.ASCE – Hydraulic Engineering*, 139, 2, 195-204.

Jesson, M., Sterling, M. and Bridgeman, J., 2013, Despiking Velocity Time-Series -Optimisation Through the Combination of Spike Detection and Replacement Methods, *Flow Measurement and Instrumentation*, 30, 45-51, 10.1016/j.flowmeasinst.2013.01.007.

Harris, C.N.H, Quinn, A.D. and Bridgeman, J., 2012, "The use of probabilistic weather generator information for climate change adaptation in the UK water sector", *Meteorological Applications*, doi/10.1002/met.1335.

Jesson, M., Sterling, M. And Bridgeman, J., 2012, "An experimental investigation of turbulence in a heterogeneous open channel", *Proceedings of the ICE – Water Management*. doi 10.1680/wama.11.00025.

Bridgeman, J., 2012, "Numerical modelling of sewage sludge mixing", *Advances in Engineering Software*, 44, 54-62. doi 10.1016/j.advensoft.2011.05.037.

Bieroza, M., Baker, A. and Bridgeman, J., 2012, "Assessing organics removal in water treatment with data mining and artificial neural networks", *Advances in Engineering Software*, 44, 126-135. doi 10.1016/j.advensoft.2011.05.031.

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Baker, A., Gulliver, P., Ascough, P., Roe, J. and Bridgeman, J., 2011, "Assessing the effect of sterilisation on the radiocarbon signature of freshwater dissolved organic matter", Radiocarbon, 54, 4, 659-667.

Bridgeman, J., 2011, Hydrodynamic and physico-chemical process simulation in the water industry, Computational Technology Reviews, Volume 4, Y. Tsompanakis and B.H.V. Topping, (Guest-Editors), Saxe-Coburg Publications, ISBN 978-1-874672-54-8, ISSN 2044-8430.

Bieroza, M., Baker, A. and Bridgeman, J., 2011, "An assessment of low pH coagulation performance using fluorescence spectroscopy", J.ASCE – Environmental Engineering, 137, 7, 596-601.

Bridgeman, J., Bieroza, M. and Baker, A., 2011, "The application of fluorescence spectroscopy to organic matter characterisation in drinking water treatment", Reviews in Environmental Science and Bio/Technology, 10, 3, 277-290.

Brown, D., Bridgeman, J., and West, J.R., 2011a, "Understanding data requirements for trihalomethane formation modelling in water supply systems" Urban Water Journal, 8, 1, 41-56.

Brown, D., Bridgeman, J., and West, J.R., 2011b, "Predicting chlorine decay and THM formation in water supply systems", Reviews in Environmental Science and Bio/Technology, 10 (1), 79-99 DOI 10.1007/s11157-011-9229-8.

Bieroza, M., Baker, A. and Bridgeman, J., 2010b, "Classification and calibration of organic matter fluorescence data with chemometric methods and artificial neural networks: an operational tool for improved drinking water treatment", Environmetrics, DOI: 10.1002/env.1045.

Bieroza, M., Baker, A. and Bridgeman, J., 2010a, "Assessing organic matter removal efficiency at water treatment works using fluorescence spectroscopy", Drinking Water Engineering and Science, 3, 63–70, 2010.

Bradford, W.T., Bridgeman, J. and Gaterell, M., 2010, "Water Demand Forecasting for Birmingham", ICE Proceedings – Engineering Heritage, 163, 1, 39-49.

Bridgeman, J., 2010, "Water Industry Asset Management in England and Wales: Successes and Challenges", Water and Environment Journal, doi:10.1111/j.1747-6593.2010.00224.x.

Bridgeman, J., Jefferson, B. and Parsons, S.A., 2010, "The development and use of CFD models for water treatment flocculators", Advances in Engineering Software, 41, 99-109.

Brown, D., West, J.R., Curtis, B.J. and Bridgeman, J., 2010, "Modelling THMs in Water Treatment and Distribution Systems", ICE Proceedings – Water Management, 163, 4, 165-174, doi 10.1680/wama.2010.163.4.165.

Bieroza, M., Baker, A. and Bridgeman, J., 2009b, "Exploratory analysis of excitation-emission matrix fluorescence spectra with self-organizing maps as a basis for determination of organic matter removal efficiency at water treatment works", J. Geophys. Res., 114, G00F07, doi:10.1029/2009JG000940.

Bieroza, M., Baker, A. and Bridgeman, J., 2009a, "Relating freshwater organic matter fluorescence to organic carbon removal efficiency in drinking water treatment", Science of the Total Environment, 407, 1765-1774.

Bridgeman, J., Jefferson, B. and Parsons, S.A., 2009, "Computational fluid dynamics modelling of flocculation in water treatment: A review", Engineering Applications of Computational Fluid Mechanics, 3, 2, 220–241.

Brint, A., Bridgeman, J. and Black, M., 2009, "The Rise and Future Direction of Asset Management in Utility Industries", J. Operational Research Society, 60, S106-113.

Curtis, B.J., West, J.R. and Bridgeman, J., 2009b, "Chlorine Demand-Based Predictive Modelling of THM Formation in Water Distribution Networks", Urban Water Journal, 6, 6, 407-415.

Curtis, B.J., West, J.R. and Bridgeman, J., 2009a, "Temporal and Spatial Variations in Bulk Chlorine Decay within a Water Supply System", J.ASCE – Environmental Engineering, 135, 3, 147-152.

Roe, J., Baker, A. and Bridgeman, J., 2009, "Relating organic matter character to THM formation potential: a data mining approach", Water Science and Technology: Water Supply-WSTWS, 8.6, 717-723.

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Bridgeman, J., Simms, J.S. and Parsons, S.A., 2002b, "The use and application of particle count data in water treatment", J.CIWEM, 16, 3, 164-170.

Bridgeman, J., Simms J.S. and Parsons, S.A., 2002a, "Practical and theoretical analysis of relationships between particle count data and turbidity", J.Water Supply: Research and Technology – AQUA, 51. 5, 263-271.

Bridgeman, T. and Bridgeman, J., 1994, "Radiation from a point source in an infinite medium", Die Farbe, 38, 4/6.