

12th International Conference

Pressure Surges

Pressure Surges, Fluid Transients & Water Hammer

Dublin
18th -20th November 2015

Tuesday 17th November 2015

09:00-17:00	<p>Technical Visits Visits to Turlough Hill Pumped Storage Scheme and Glendalough Monastic Site, lunch included.</p>
17:00-19:00	<p>Early Registration</p>

Wednesday 18th November 2015

07:30-08:30	<p>Morning Registration</p>
08:45	<p>Welcome by Conference Chairman, Dr Arris Tijsseling</p>
08:50	<p>Opening Address - "Living with Surges" President William (Bill) Grimson, Engineers Ireland, Dublin</p>

Session 1: Industrial case studies Chairperson: Dr Anton Bergant, Litostroj Power d.o.o., Slovenia

09:15	<p>Case studies of the design and performance of one-way surge tanks in pumped water and wastewater pipelines B Madin; BSE; R Austin, Innovyze, Australia <i>(page 463)</i></p>
09:30	<p>Controlling pressure transients in large diameter transmission mains with little allowance for surge D H Axworthy, Northwest Hydraulic Consultants Inc., USA <i>(page 477)</i></p>
09:45	<p>Full scale ambient water flow tests of a 10-inch emergency release coupling for LNG transfer J van der Putte, E van Bokhorst, TNO Technical Sciences, The Netherlands; T Webber, C Revell, KLAW LNG, UK <i>(page 493)</i></p>
10:00	<p>Use of pressure surge for unblocking hydrocarbon pipelines H Mackenzie, R Campbell, Paradigm Flow Services; A E Vardy, University of Dundee; UK <i>(page 509)</i></p>
10:15	<p>Air valves/vacuum breakers; a modelling nightmare P Glover, Peter Glover Consulting Ltd, UK <i>(page 523)</i></p>

10:30 - 11:00	Refreshment Break
Session 2: Aerospace industry Chairperson: Dr Steve Murray, BP Exploration Ltd., UK	
11:00	KEYNOTE PAPER: Multi-phase fluid-hammer in aerospace applications Professor Johan Steelant (ESA-ESTEC), The Netherlands (<i>page 21</i>)
11:30	Effect of the dissolved pressurizing gas on the pressure surge during the filling process of spacecraft feedlines C Bombardieri, T Traudt , C Manfletti , DLR Lampoldshausen, Germany (<i>page 33</i>)
11:45	High speed imaging of water hammer with column separation T Traudt, C Bombardieri, C Manfletti, DLR Lampoldshausen, Germany (<i>page 47</i>)
12:00	Aircraft refuel rig pressure surge modelling and test verification D Morrison, R Illidge, Airbus Operations Ltd, UK (<i>page 59</i>)
12:15 - 13:15	Lunch
Session 3: Entrapped air Chairperson: Dr Janek Laanearu, Tallinn University of Technology, Estonia	
13:15	Modeling trapped air pockets in a combined sewage storage tunnel P Klaver, J Wolfe, LimnoTech, USA; D Crawford, Thames Tideway Tunnel Delivery Team, UK; J G Vasconcelos, Auburn University, USA (<i>page 159</i>)
13:30	Effective de-aeration of pipelines and the use of captured air to mitigate dynamic pressures S J van Vuuren, University of Pretoria, South Africa (<i>page 171</i>)
13:45	Rapid filling of an open-ended pipeline with entrapped air L Zhou, D Liu, H Wang, Hohai University, China; B Karney, A Malekpour, University of Toronto, Canada (<i>page 185</i>)
14:00	Exploring how air valves change transient responses of pipe systems during rapid filling A Malekpour, HydraTek & Associate Inc.; B Karney, University of Toronto, Canada (<i>page 199</i>)
14:15	Lagrangian modelling of fluid transients in pipelines with entrapped air D Q Hou, S Wang, Tianjin University, China; A C H Kruisbrink, University of Nottingham, UK; A S Tijsseling, Eindhoven University of Technology, The Netherlands (<i>page 215</i>)
14:30	Entrapped air pocket analysis using CFD N M C Martins, H M Ramos, D I C Covas, Universidade de Lisboa, Portugal, A K Soares, Federal University of Goiás, Brazil (<i>page 229</i>)
14:45	Physical explanation of the effect of pipe and liquid elasticity on the transient pressures following rapid pressurization of pipelines with entrapped air A Malekpour, HydraTek & Associates; B Karney, University of Toronto, Canada (<i>page 239</i>)

15:00 - 15:30	Refreshment Break
Session 4: Industrial case studies Chairperson: Professor Angus Simpson, University of Adelaide, Australia	
15:30	KEYNOTE PAPER: Analysis and control of hydraulic transients: practical aspects and considerations Professor M. Hanif Chaudhry, University of South Carolina, USA (<i>page 439</i>)
16:00	Surge alleviation at Wilmslow water treatment works high lift pumping station S Massey, C Robinson, MMI Engineering Ltd; M Bingham, MWH Treatment; T Dempsey, United Utilities Group PLC; UK (<i>page 435</i>)
16:15	New cavitation experiments compared with in-house surge analysis software F Bos, Dynaflo Research Group, The Netherlands
16:30 - 16:45	Stretch Break
Session 5: Debate session Chairperson: Professor Stephen Beck, University of Sheffield, UK	
16:45	“Current surge control is primitive” Proposing Proposition Lead: Dr Paul Boulos, Innovyze Inc., USA Seconder: Professor Helena Ramos, IST- Technical University of Lisbon, Portugal Opposing Proposition Lead: Dr Ivo Pothof, Deltares, Delft, NL Seconder: Mrs Belinda Madin, BSE, Australia
17:15	Sessions Close
18:00 - 19:00	Drinks reception <i>An excellent opportunity to network with speakers, delegates and exhibitors in an informal setting</i>

Thursday 19th November 2015

Session 6: Hydropower industry

Chairperson: Dr Jiří Koutník, Voith Hydro Holding GmbH & Co. KG, Germany

08:45	Modelling a transient event at an hydroelectric scheme P J Purcell, University College Dublin, Eire (page 379)
09:00	Large and rapid set-point adjustment of hydro power plants using embedded transient hydraulic simulations of the plant as a model predictive method B Svingen, Rainpower Norway AS/NTNU, H H Francke, Flow Design Bureau AS, Norway (page 391)
09:15	Numerical study prior to a turbine commissioning test F Sadeque, J Taylor, BC Hydro, Canada (page 405)
09:30	Case study: Damaging effects of increasing the installed capacity in an existing hydropower plant K Vereide, B Svingen, Norwegian University of Science and Technology; R Guddal, Sira-Kvina Power Company, Norway (page 417)
09:45	Effect of pressure relief valves on the fluid transients in the penstocks of a small run-of-river plant S Dursun; Z Bozkuş; A E Dinçer, Civil Engineering Department, METU, Turkey (page 425)
10:00 - 10:30	Refreshment Break

Session 7: Multi-phase transients

Chairperson: Mrs Sarah Jones, Mott MacDonald, UK

10:30	KEYNOTE PAPER: State-of-the-art modelling of multi-phase transients Professor Iztok Tiselj, 'Jožef Stefan' Institute, Slovenia (page 655)
11:00	KEYNOTE PAPER: Surges associated with rapid filling of stormwater tunnels and transmission mains – An overview of the existing research J G Vasconcelos, Auburn University, USA (page 681)
11:30	Special Session Delegate Discussion <i>Professors Iztok Tiselj and Jose Vasconcelos will invite interactive dialogue with Delegates to explore the (im) possibilities in the modelling, computing and validating of multi-phase fluid-hammer.</i> <i>For single-phase fluids we rely on our established one-dimensional models.</i> <i>But can we do so for multi-phase fluids?</i> <i>Can our 1-D models be improved to account for interactions in unsteady two-phase flows?</i> <i>Or do we need to go fully three-dimensional using CFD?</i> <i>Can we currently identify all existing shortcomings of either (1D-3D) modelling strategies?</i> <i>Aren't the phenomena too complex and too unstable to be analysed?</i> <i>What experimental and field studies can we do to help us understand unsteady multi-phase transients?</i> <i>Is it worth spending any money on research in this direction?</i> <i>Can we currently assess all costs and impacts of unsteady multi-phase transients in engineered systems?</i> <i>Don't air and steam spoil our engineering lives?</i> <i>Or do they enrich them?</i> Delegate participation <i>We are sure that all Delegates have experiences with this topic – please prepare your opinions.</i>

12:00 - 13:00	Lunch
Session 8: CFD and unsteady friction Chairperson: Bjørnar Svingen, Rainpower Norge AS, Norway	
13:00	Computation of steam-water transients using a two-fluid seven-equation model H Lochon, EDF R&D, IMSIA and 12M; F Daude, EDF R&D and IMSIA; P Galon, IMSIA and CEA; J-M Hérard, EDF R&D and 12M, France <i>(page 69)</i>
13:15	Wall shear stress in unsteady flow analysis using CFD N M C Martins, H M Ramos, D I C Covas, Universidade de Lisboa, Portugal; A K Soares, Federal University de Goiás, Brasil <i>(page 83)</i>
13:30	Direct numerical investigation of unsteady turbulent pipe flow Y M Chung, Z Wang, University of Warwick, UK <i>(page 99)</i>
13:45	Simple modelling of unsteady friction factor K Urbanowicz, West Pomeranian University of Technology, Poland <i>(page 113)</i>
14:00 - 14:30	Refreshment Break
Session 9: Fundamentals Chairperson: Dr Nigel Johnston, University of Bath, UK	
14:30	Work and life of Piotr Szymański K Urbanowicz, West Pomeranian University of Technology, Poland; A S Tijsseling, Eindhoven University of Technology, The Netherlands <i>(page 311)</i>
14:45	Method of characteristics: (Why) is it so good? A E Vardy, University of Dundee, UK; A S Tijsseling, Eindhoven University of Technology, The Netherlands <i>(page 327)</i>
15:00	What is wave speed? A S Tijsseling, Eindhoven University of Technology, The Netherlands; A E Vardy, University of Dundee, UK <i>(page 343)</i>
15:15	On the behaviour of high frequency acoustic waves in pressurized inviscid fluid in a conduit M Louati, M S Ghidaoui, The Hong Kong University of Science and Technology, China <i>(page 361)</i>
15:30 - 15:45	Stretch Break
Session 10 - Codes and databases Chairpersons: Dr Didia Covas, IST - Technical University of Lisbon, Portugal; and Bryan Karney, University of Toronto, Canada	
15:45	Proposal for an improved approach for the simplified force calculation procedure after rapid valve closure in the European standard EN 13480-3 T Neuhaus, TUEV Nord SysTec GmbH & Co. KG, Germany <i>(page 133)</i>
16:00	Water hammer software performance analysis and validation via a web-database S van der Zwan, A Heinsbroek, M Tukker, Deltares, The Netherlands; B Karney, University of Toronto, Canada; A Bergant, Litostroj Power d.o.o., Slovenia <i>(page 149)</i>

Special Session Delegate Discussion

16:15

Professor Bryan Karney from Canada and Didia Covas from Portugal will invite interactive dialogue with delegates to explore whether we have matured enough to allow us to set up a semi-permanent gallery or repository of surge data and standard simulation results. There are multiple aspects to this, that would include having a reliable and trustworthy set of standard code output to check both programs and the users of programs with their basic conceptualization of the transient world, having a set of experimental data that will be begin to introduce more complexity and realism, to a set of field data to confirm performance in a set of standard applications. But endless questions arise:

Should particular aspects of this work be prioritized, and if so, what?

Who or what group would maintain this collection?

Would be responsible for updates?

Would one work to have certified practitioners?

Could contributions be given official recognition to encourage participation?

Who would cover the inevitable expenses of such a system?

Could be the emission of certificates be a potential source income to keep the system?

Could we apply to EU funding (e.g. thematic network)?

Delegate participation

We are sure all Delegates will have views on this vital topic – please prepare your thoughts on this, even if they might be controversial (nothing will be “on the record”!), especially if you have case experience to share which illustrates your point of view”.

16:45

Sessions Close

18:50 -
22:30

Conference Dinner - Barberstown Castle

This Private Event will be hosted exclusively for delegates, it includes and features a unique Medieval Irish show performed by world renowned Damhsa who have performed for the Queen and other famous dignitaries with high acclaim.

On entering the Medieval Banqueting Hall you will be greeted by the Ghost of Nicholas Barby and served a glass of Irish Mead. Your Medieval Feast is served with 2 glasses of wine. After dinner, the history of Ireland and Barberstown Castle will come alive through the Medieval Show.

Coaches will depart from the main reception at the Gresham Hotel at 18:50

Best paper award

The winner of the prestigious Pressure Surges best paper award, as voted by the conferences technical advisory committee will be announced during the dinner. This award is kindly sponsored by Deltares.



Friday 20th November 2015

Session 11: Pumps, valves and vessels

Chairperson: Mr Martin Hamilton, Spectrum Fluid Dynamics, UK

09:00	<i>In Situ</i> Determination of polar moment of inertia of pump-motor assembly C S Martin, Georgia Institute of Technology, USA (<i>page 703</i>)
09:15	Thermodynamics of surge vessels S van der Zwan, Deltares; M Toussaint, Delft University of Technology; A Alidai, I W M Pothof, Deltares and Delft University of Technology, The Netherlands; P H Leruth, Abu Dhabi Transmission & Despatch Company (TRANSCO), UAE (<i>page 713</i>)
09:30	Theoretical and experimental analysis of pressure surge in a two-phase compressed air vessel M Besharat, Islamic Azad University, Iran and Universidade de Lisboa; H M Ramos, Universidade de Lisboa, Portugal (<i>page 729</i>)
09:45	Hydraulic design and modelling of large surge tanks W Richter, G Zenz, Graz University of Technology, Austria; K Vereide, Norwegian University of Science and Technology, Norway (<i>page 745</i>)
10:00	The crucial role of air vacuum valve vertical position on producing secondary transient pressures L Ramezani, B Karney, University of Toronto, Canada (<i>page 761</i>)
10:15	Transient flow inside of vortex chamber diodes F Haakh, Zweckverband Landeswasserversorgung, Germany (<i>page 775</i>)
10:30 - 11:00	Refreshment Break

Session 12: Accidents and incidents

Chairpersons: Mr Michael Papworth, Consultant, UK; and Professor Sam Martin, Georgia Institute of Technology, USA

11:00	KEYNOTE PAPER: The 2007 New York City steam explosion: post-accident analysis Professor Robert Vecchio, Lucius Pitkin Inc., New York (<i>page 7</i>)
11:30	Open forum - "Spectacular failures and transient related accidents" <i>Professor Sam Martin, Georgia Tech, and Mr Michael Papworth, Consultant; will chair this exciting session. By sharing experiences we hope delegates might gain a better understanding of practical problems and realise the complexity of designing against and predicting surge. We need delegates to describe real problems that have arisen where designs or constructions do not behave in the way expected and to go beyond redesigns and discuss those instances where there was a spectacular failure.</i> <i>There will be no written papers for these sessions but the Committee asks delegates to contribute to these discussions.</i> <i>Delegate participation requested – Please notify Ally Lynes at confx2@bhrgroup.co.uk if you have a case you would like to share.</i>

12:00 - 13:00	Lunch
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Session 13: Fluid-structure interaction and turbidity
Chairperson: Professor Dave Wiggert, Michigan State University, USA

13:00	<p>Hydraulic transients in straight and coil pipe rigs D Ferras, Universidade de Lisboa, Portugal and École Polytechnique Fédérale de Lausanne, Switzerland; P A Manso, A J Schleiss, École Polytechnique Fédérale de Lausanne, Switzerland; D I C Covas, Universidade de Lisboa, Portugal <i>(page 257)</i></p>
13:15	<p>Interaction between hydraulic transient events and structure vibration M Simão, H M Ramos, University of Lisbon, Portugal; J Mora-Rodriguez, Universidad de Guanajuato, Mexico <i>(page 273)</i></p>
13:30	<p>FSI study on the human veins M Simão, J M Ferreira, H M Ramos, University of Lisbon, Portugal; J Mora-Rodriguez, Universidad de Guanajuato, Mexico <i>(page 287)</i></p>
13:45	<p>Do transients contribute to turbidity failures of water distribution systems? S Jones, R Collins, J Boxall, University of Sheffield, UK <i>(page 297)</i></p>

14:00 - 14:30	Refreshment Break
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Session 14: Industrial case studies
Chairperson: Dr Peter Glover, Peter Glover Consulting Ltd., UK

14:30	<p>Anatomy of surge analysis for industrial firewater systems — “we never have problems with firewater systems!” L C Ireland, F A Locher, Bechtel NS&E; J D O’Sullivan, S Koirala, Bechtel Oil Gas & Chemicals, USA <i>(page 537)</i></p>
14:45	<p>Pressure surges with “zero flow” in a fire fighting reticulation system A Heinsbroek, Deltares, The Netherlands; B Karney, University of Toronto, Canada <i>(page 549)</i></p>
15:00	<p>Integration of emergency control systems in the anti-surge design of large transmission schemes S van der Zwan, Deltares; A Alidai, I W M Pothof, Deltares and Delft University of Technology, The Netherlands; P H Leruth, Abu Dhabi Transmission & Despatch Company (TRANSCO), UAE <i>(page 557)</i></p>
15:15	<p>Efficient assessment of transmission mains and control systems by means of numerical modelling L Mecksenaar, S H Balkema, Royal HaskoningDHV; E Arpadzic, E Vermaas, Evides Water company, The Netherlands <i>(page 567)</i></p>

15:30 - 15:45	Stretch Break
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Session 15: Leak detection, monitoring and experiments
Chairperson: Dr Frédéric Daude, Électricité de France, France

15:45	The use of the cross-correlation of two signals as a transient leak detection method N Motazedi, S B M Beck, University of Sheffield, UK (page 581)
16:00	Field study on pipeline parameter identification using fluid transient waves with time-domain analysis J Gong, Y Kim, M Lambert, A Simpson, A Zecchin, The University of Adelaide; H Fandrich, East Gippsland Water, Australia (page 595)
16:15	A method to identify transients from pressure signal recorded in real water distribution networks D Starczewska, R Collins, J Boxall, University of Sheffield, UK (page 609)
16:30	Experimental and analytical study of the air-water interface kinematics during filling and emptying of a horizontal pipeline J Laanearu, Tallinn University of Technology, Estonia; D Q Hou, Tianjin University, China; A S Tijsseling, Eindhoven University of Technology, The Netherlands (page 625)
16:45	Developments in valve-induced water-hammer experimentation in a small-scale pipeline apparatus A Bergant, Litostroj Power d.o.o., Slovenia; U Karadžić, University of Montenegro, Montenegro (page 693)
17:00	Closing address by Conference Chairman, Dr Arris Tijsseling and Professor Angus Simpson
17:15	Sessions Close
	<p>With thanks to our sponsors:</p>  <p>and exhibitors:</p>    