

# *Curriculum Vitae*

## **Mark Trevethan**

**Postdoctoral Research Engineer**

### **RESEARCH INTERESTS**

- Estuarine, river and coastal processes
- Alternative energy sources and technology
- Investigation of hydrodynamic, turbulence, mixing and sediment transport properties in natural systems
- Development and application of simple numerical models that improve understanding of physical processes in natural systems
- Development and implementation of new analysis techniques for study of turbulence in natural systems
- Planning and undertaking field and laboratory experiments to improve understanding of natural system processes

### **PUBLICATIONS**

#### **Number of Publications (not including submitted articles)**

(Note - Full listing of publications can be found at the end of this CV)

<b>Journal Articles</b>	<b>13</b>
<b>Book Chapters</b>	<b>1</b>
<b>Refereed Technical Reports</b>	<b>4</b>
<b>Refereed Conference Papers</b>	<b>10</b>
<b>Pending Patents</b>	<b>1</b>

### **EDUCATION**

**2004 to 2007**

**University of Queensland (Australia)**

**Doctorate of Philosophy (PhD)**

#### **A Study of Turbulence and Mixing in a Small Subtropical Estuary**

- Study of turbulence and turbulent mixing processes in small subtropical estuaries of Southeast Queensland
- Planned and conducted field investigations in several estuaries and analysed data using programs developed as part of project
- **Received Dean's Award for Outstanding Thesis 2008**

**2002 to 2003**

**Monash University (Australia)**

**Masters of Engineering Science (Research)**

#### **The Effects of Non-linearities on Tidal Inlet Dynamics**

- Developed non-linear parameter single-cell model to better simulate hydrodynamics of tidal inlets
- Conducted field investigations of tidal inlets to understand natural phenomena and validate model

**1994 to 1999**

**Monash University (Australia)**

**Bachelor of Engineering (Mechanical)**

Graduated with Honours

- Specialised in Engineering Design and Environmental Fluid Mechanics
- Undergraduate Thesis was a laboratory study of vortex shedding created by interaction of long waves and bathymetry in natural systems

## **EMPLOYMENT HISTORY**

### **Principle Researcher/Consultant:**

**2011 to 2014**      **Natural-systems Research Group (Australia)**  
Private natural systems research and engineering consulting business

#### **Research/Consulting Projects:**

**Jul 2011 to 2014**      **Water Flow Electricity Generator Project**  
Design, development and testing of an apparatus for generating electricity from flowing water

- Invented a device for extracting electricity from flowing water
- Developed prototypes for testing key concepts of apparatus
- Obtained Australian provisional patent Feb. 2013 (No. 2012900423)
- Published PCT patent application (No. PCT/AU2013/000106)

### **Postdoctoral Research Projects:**

**Mid 2009 to 2011**      **University of Auckland (New Zealand)**  
**Investigation of fluid and sediment interactions and transport**

- Assisted in design and development plastic magnetic particle flume for investigation of fluid and sediment interactions with fixed and mobile beds
- Conducted and analysed detailed laboratory experiments in oil and magnetic particle flumes using Particle Image Velocimeter (PIV)

**2008 to Mid 2009**      **MARUM, University of Bremen (Germany)**  
**Investigation of suspended sediment fluxes in German estuaries**

- Investigation of hydrodynamic, turbulence, mixing and sediment transport properties in estuaries and tidal channels
- Designed and undertook physical measurements of hydrodynamic, turbulence, suspended sediment and physio-chemical properties to study estuarine fluid mud dynamics
- Analysis of field data collected with various remote acoustic instruments on Ems and Weser Rivers between 2002 and 2007

### **Post-graduate Research Projects:**

**Jan to Mar 2007**      **Toyohashi University of Technology (Japan)**  
**Investigation of turbulence and sediment transport in Hamana Lake**

- Analysis of turbulence and physio-chemistry data collected in Hamana Lake
- Part of larger investigation of sediment transport processes in Hamana Lake and the surrounding coastal region
- Investigated effects of wind waves and tidal currents on turbulence and sediment transport and implications mixing and transport mechanisms

**Oct 2007**      **University of Queensland (Australia)**  
**Investigation of turbulence and turbulent bursting events in small subtropical estuary (Eprapah Creek Australia)**

- Analysis of turbulence and physio-chemistry field data collected at Eprapah Creek in June 2007
- Investigated cross-correlation of turbulence data by three probes and turbulent bursting events within field data collected

## **PUBLICATIONS LIST**

### **Journal Articles**

- Chanson, H., Brown, R. and Trevethan, M. (2012) - Turbulence measurements in small subtropical estuary under king tidal conditions - Environmental Fluid Mechanics, 12(3), pp. 265-289
- Chanson, H. and Trevethan, M. (2011) - Vertical mixing in the fully developed turbulent layer sediment-laden open-channel flow – Discussion – Journal of Hydraulic Engineering ASCE, 137(9), pp. 1095-1097
- Trevethan, M. and Chanson, H. (2010) - Turbulence and turbulent flux events in a small estuary – Environmental Fluid Mechanics, 10(3), pp. 345-368
- Trevethan, M. and Aoki, S. (2009) - Initial observations on relationships between turbulence and suspended sediment properties in Hamana Lake, Japan - Journal of Coastal Research, SI-56, pp. 1434-1438
- Trevethan, M. and Chanson, H. (2009) – Turbulent mixing in a small estuary: Detailed measurements – Estuarine, Coastal and Shelf Science, 80(1), pp. 191-200
- Trevethan, M., Chanson, H. and Brown, R. (2008) – Turbulence measurements in a small subtropical estuary with semi-diurnal tides – Journal of Hydraulic Engineering ASCE, 134(11), pp. 1665-1670
- Trevethan, M., Chanson, H. and Brown, R. (2008) – Turbulence characteristics in a small subtropical estuary during and after some moderate rainfall – Estuarine, Coastal and Shelf Science, 79(4), pp. 661-670
- Chanson, H., Trevethan, M. and Aoki, S. (2008) – Acoustic Doppler velocimetry (ADV) in a small estuary: field experience and signal post-processing – Flow Measurement and Instrumentation, 19(5), pp. 307-313
- Chanson, H., Takeuchi, M. and Trevethan, M. (2008) – Using Turbidity and Acoustic Backscatter Intensity as Surrogate Measures of Suspended Sediment Concentration in a Small Sub-Tropical Estuary – Journal of Environmental Management, 88, pp. 1406-1416
- Trevethan, M., Chanson, H. and Takeuchi, M. (2007) – Continuous high-frequency turbulence and suspended sediment concentration measurements in an upper estuary – Estuarine, Coastal and Shelf Science, 73(1-2), pp. 341-350
- Trevethan, M. and Chanson, H. (2007) – Detailed measurements during a transient front in a small subtropical estuary – Estuarine, Coastal and Shelf Science, 73(3-4), pp. 735-742
- Chanson, H. and Trevethan, M. (2007) – Turbulence in Small Sub-Tropical Estuary with Semi-Diurnal Tides – Pearl River, Renmin Zhujiang, No. 1, Feb., pp. 16-22 (ISSN 1001-9235) (in Chinese)
- Chanson, H., Trevethan, M. and Koch, C. (2007) – Turbulence measurements with acoustic Doppler velocimeters – Discussion – Journal of Hydraulic Engineering ASCE, 133(11), pp. 1283-1286

### **Refereed Book Chapters**

- Chanson, H. and Trevethan, M. (2010) – Turbulence, Turbulent Mixing and Diffusion in Shallow Water Estuaries – Atmospheric Turbulence, Meteorological Modelling and Aerodynamics, (Eds. Lang, P. and Lombargo, F.), Nova Science, New York, USA

## Refereed Technical Reports

- Chanson, H., Brown, R. and Trevethan, M. (2010) – Turbulence measurements in a small subtropical estuary under king tide conditions – Report No. CH77/10, School of Civil Engineering, University of Queensland, Australia, ISBN 9781864999969, 82 pages
- Trevethan, M., Chanson, H., and Brown, R.J. (2007) – Turbulence and turbulent flux events in a small subtropical estuary – Report No. CH65/07, Div. of Civil Engineering, University of Queensland, Australia, ISBN 9781864998993, 67 pages
- Chanson, H., Takeuchi, M. and Trevethan, M. (2006) – Using turbidity and acoustic backscatter intensity as surrogate measures of suspended sediment concentration. Applications to a sub-tropical estuary (Eprapah Creek) - Report No. CH60/06, Div. Of Civil Engineering, University of Queensland, Australia, ISBN 186498628, 23 pages
- Trevethan, M., Chanson, H. and Brown, R. (2006) – Two series of turbulence measurements in a small subtropical estuarine system – Report No. CH58/06, Div. Of Civil Engineering, University of Queensland, Australia, ISBN 1864998520, 75 pages

## Refereed Conference Papers

- Coleman, S., Nikora, V., Trevethan, M., Cater, J. and Nokes, R. (2011) – Magnetic-particle flume for sediment-transport investigations – Proceedings of 7<sup>th</sup> IAHR Symposium on River, Coastal and Estuarine Morphodynamics, Beijing, China
- Trevethan, M., Coleman, S. and Cater, J. (2010) – Bed shear stress measurements behind a backward facing step using PIV – Proceedings of 17<sup>th</sup> Australasian Fluid Mechanics Conference, Auckland New Zealand, Paper 52
- Trevethan, M. and Chanson, H. (2010) – A note of burst event detection in unsteady natural flows – Proceedings of 17<sup>th</sup> IAHR-APD Congress, Auckland, New Zealand, (Eds. Mellville, B., De Costa G. and Swann, T.), 10 pages (ISBN 0-86869-125-9)
- Trevethan, M., Wurpts, A. and Becker, M. (2009) – High frequency measurements about the water fluid mud boundary in the estuarine zone of the Ems River Germany - Proceedings of 33<sup>rd</sup> Biennial IAHR Congress, Vancouver, Canada, Paper 10452, pp. 4167-4174
- Chanson, H., Trevethan M. and Takeuchi, M. (2007) – High-frequency turbulence and suspended sediment flux measurements in an upper estuarine zone – Proc. 32nd IAHR Biennial Congress, Venice, Italy, (Ed. Di Silvio, G. and Lanzoni, S.) Topic D1.b, 10 pages
- Chanson, H., Takeuchi, M. and Trevethan, M. (2007) – High-frequency suspended sediment flux measurements in a small estuary – Proc. 6th International Conference on Multiphase Flow ICMF 2007, Leipzig, Germany, July 9-13, (Ed. Sommerfeld, M.) Session 7, Paper No. S7\_Mon\_C\_S7\_Mon\_C\_5, 12 pages (CD-ROM)(ISBN 978-3-86010-913-7)
- Chanson, H. and Trevethan, M. (2006) – Turbulence in small sub-tropical estuary with semi-diurnal tides – Proc. 2<sup>nd</sup> Intl Conf. on Estuaries & Coasts (ICEC-2006), Guangzhou, Guangdong Province, China, November 28-30, Invited paper, Guangdong Economy Publ., Vol. I, pp. 140-151, (ISBN 7-80728-422-6)
- Chanson, H., Trevethan, M. and Aoki, S. (2005) – Acoustic Doppler Velocimetry (ADV) in a Small Estuarine System. Field Experience and “Despiking”. – Proceedings of 31<sup>st</sup> Biennial IAHR Congress, Seoul, Korea, Paper 0161, pp. 3954-3966
- Hinwood, J., McLean, E. and Trevethan, M. (2005) – Spring tidal pumping – Proceedings of Coasts and Ports Australasian Conference, Adelaide, Australia, September 2005, pp. 601-606
- Hinwood, J., Trevethan, M. and McLean, E. (2003) – The effects of entrance parameters on tides in inlets – Proceedings of Coasts and Ports Australasian Conference, Auckland, New Zealand, September 2003, Paper 155, (CD-ROM)