

Dr. David M. Kelly

BIRTH DATE 15th May 1979

CONTACT INFORMATION 2435 Greenwich Drive #79, Oakville, Ontario L6M 0S4, Canada. *Tel (Office/Daytime): +1 754 273 8714*
Tel (Home/Evening): +1 754 273 8714
E-mail: Mach3h1@gmail.com

PROFILE I am a hard working, dedicated and extremely motivated senior level coastal engineer specializing in research relating to the development and utilization of numerical models. Over the past decade I have gained a significant knowledge base through both developing and running a wide variety of numerical models. Throughout my time as a researcher, consultant and developer I have acquired extensive professional experience in leading challenging commercial and research projects in both coastal and offshore marine environments. During my career I have applied my numerical modelling skills internationally to a range of marine engineering problems including: offshore wind turbine foundations, sub-sea structures, offshore breakwaters and reefs, seawalls, dredged sediment dispersion, beach- and coastline-evolution. I have also been at the forefront of the development of new state-of-the-art storm tide models for hurricane induced storm surge. I am confident in working with people in both managerial and team roles as well as being capable of working alone on long and complex projects.

EDUCATION **University of Nottingham**, Nottingham, UK
Ph.D., Civil Engineering, January 2009.
Dissertation Topic: 'Bore-driven swash on a mobile beach'

University of Bristol, Bristol, UK
PGCE, Science (Physics), July, 2002.

University of East Anglia (UEA), Norwich, UK
BSc. (Hons – First class), Environmental Physics with Mathematics, June, 2000.

PROFESSIONAL QUALIFICATIONS PRINCE2[®] Qualified practitioner.

AWARDS

- OpenMI Association Award for FluidEarth2 2012

EMPLOYMENT HISTORY **W. F. Baird & Associates Coastal Engineers**, Oakville, Ontario, Canada
Senior Engineering Scientist **September, 2017 – Present**
My current position includes being responsible for the development of new commercial storm surge and computational fluid dynamics (CFD) models at Baird. As well as developing new numerical models, this work involves tailoring numerical models to clients needs through modification of the source code and the incorporation of new numerical approaches. My job also includes bidding for, and undertaking, numerical modelling studies which range from port developments to rainfall and runoff modelling for large urban areas. Recently I have been involved in the development of the TELEMAC model for combined storm tide and rainfall run-off modelling which includes infiltration; this project is being undertaken in collaboration with électricité de France (EDF) R&D and will ultimately form part of the official TELEMAC release. In addition to this work I am working on in-house CFD. Part of this work involves collaborating with the Department of Computer Sciences at the University of Waterloo, Ontario to facilitate knowledge transfer from academia to industry.

Coastal Research Lab., IHRC, Florida International University, Miami, Florida, USA

Assistant Professor (Research)

September, 2014 – September, 2017

This position included working in the development of the next generation of storm surge models. This involved the development of a massively parallel (via MPI) dynamic adaptive mesh refinement model to solve the non-linear shallow water (NLSW) equations. Part of this work comprised the development of novel numerical schemes for solution of the 2D NLSW equations. During my time at the IHRC I worked alongside NOAA through collaboration with the US National Hurricane Center (NHC). During this period I also collaborated with both the University of Bath (UK) and HR Wallingford (UK) on novel numerical methods for solution of the full incompressible Navier Stokes equations. As well as developing a new storm surge model from scratch, I worked on developing a new CFD model to simulate two-way wave structure interactions and floating bodies such as wave energy devices. The work on both the storm surge model and CFD model was reported in a series of high quality, peer-reviewed journal papers.

HR Wallingford, Wallingford, Oxon, UK

Senior Engineer

April, 2013 – August, 2014

My responsibilities included the development and maintenance of a number of HR Wallingford's numerical models. In particular, I worked closely with EDF R&D on the development and maintenance of the TELEMAC modelling suite. I was also responsible for project management on a number of consultancy and research projects. As well as this, I was fundamentally involved in HR Wallingford's transition to adopting openFOAM[®] for CFD work. As well as testing and validating openFOAM[®] I was responsible for modifying the openFOAM[®] solver to include a compressible air phase (for use in modelling oscillating water column energy devices) and developing the scourFOAM, three-phase (air-water-sediment), solver that is used to predict scour around coastal and offshore structures.

HR Wallingford, Wallingford, Oxon, UK

Engineer

April, 2011 – April, 2013

HR Wallingford, Wallingford, Oxon, UK

Postdoctoral Research Associate (KTP)

February, 2009 – February, 2011

University of Nottingham, Nottingham, UK

Postgraduate Researcher

January, 2006 – February, 2009

KEY SKILLS

COMPUTER SKILLS

- *Engineering/Scientific Packages:* Matlab, Scilab, Octave, R
- *Mathematical Packages:* Maple, Maxima
- *Coastal Engineering Software:* SWAN, TOMAWAC, TELEMAC-2D/3D, SISYPHE, DELFT3D, DELWAQ, PISCES, COSMOS, XBEACH, BEACHPLAN, GENESIS, TUFLOW, InfoWorks, FLUID EARTH[™], OpenFOAM[®], FLOW3D, REEF3D
- *Visualization/Meshing:* Paraview, VisIt, Janet, Blue Kenue, Mermaid, NCL, R
- *Languages:* FORTRAN (expert), C/C++ (v. good), Matlab (good), R (v. good), use of Linux shell scripts for batch processing.
- *Applications:* **Linux:** L^AT_EX, Open Office, Kword, Xfig, Gimp, Kdevelop **Windows:** all office applications database, spreadsheet, and presentation software
- *Computing techniques:* Experienced in parallel computing: distributed-memory via the (open) MPI approach and shared-memory via the OpenMP approach. Experience with GPU acceleration via CUDA.
- *Algorithms:* Experience programming *finite-difference*, *finite-volume* and *MOC* based numerical solvers from scratch. Experience in developing robust wetting-drying (i.e. moving shoreline boundary) techniques for both fixed and mobile bed flow. Also, experience in various (polynomial, rational function etc.) interpolation techniques, root finding (binomial, Newton Raphson etc.) and shock fitting and capturing techniques.

- *Operating Systems*: Linux (Unix) and Windows.

PEOPLE AND PROJECT MANAGEMENT

During my time at HR Wallingford I was responsible for overseeing a number of interns and junior staff. I have also co-supervised PhD students at the University of Bath and the University of Liverpool in the UK.

MENTORING

In the past I have been actively involved in mentoring undergraduate students from disadvantaged backgrounds. As well as this I have co-supervised two PhD students (at the University of Liverpool, UK and the University of Bath, UK) and assisted a number of MSc students on industrial placements. I am currently involved in the mentoring of post graduate Engineers-In-Training at Baird.

LANGUAGES

English (first language), Italian (conversational)

DRIVING LICENCE

I hold full UK, Canadian and US car licences and a full UK motorcycle licence.

SELECTED PUBLICATIONS

PAPERS (PEER REVIEWED)

- Wang, W. and Kelly, D. M. 2018, A high-order PIC method for advection-dominated flow with application to shallow water waves, *Int. J. Numerical Methods in Fluids*, *In Press*
- Chen, Q. and Zang, J and Kelly, D. M. and Dimakopoulos, A. S. 2018, A 3D parallel Particle-In-Cell solver for wave interaction with vertical cylinders, *Ocean Engineering*, Vol 147, pp 165–180
- Chen, Q. and Zang, J and Kelly, D. M. and Dimakopoulos, A. S. 2017, A 3-D numerical study of solitary wave interaction with vertical cylinders using a parallelised Particle-In-Cell solver *Journal of Hydrodynamics Ser. B*, Vol 29, pp 790–799
- Kelly, D. M. 2017, A second-order accurate FLIC method for the 2D shallow water equations with topography. *Theoretical and Applied Mechanics Letters*, Vol 7, pp 35–40
- Li, Y. and Teng, Y-C. and Kelly, D. M. and Zhang, K. 2016, A numerical study of the impact of hurricane-induced storm surge on the Herbert Hoover Dike at Lake Okeechobee, Florida. *Ocean Dynamics*, Vol 66, pp 1699–1714
- Kelly, D. M. and Teng, Y-C. and Li, Y. and Zhang, K. 2016, Validation of the FAST forecast model for the storm surges due to hurricanes Wilma and Ike. *Natural Hazards*, Vol 83, pp 53–74
- Chen, Q. and Kelly, D. M. and Dimakopoulos, A. S. and Zang, J. 2016, Validation of the PICIN solver for 2D coastal flows, *Coastal Engineering*, Vol 112, pp 87–98
- Kelly, D. M. and Chen, Q. and Zang, J. 2015, PICIN: A Particle-in-Cell Solver for Incompressible Free Surface Flows with Two-Way Fluid-Solid Coupling *SIAM J. Sci. Comput.*, Vol. 37, pp B403–B424.
- Kelly, D. M. and Teng, Y-C. and Li, Y. and Zhang, K. 2015, A Numerical Model for Storm Surges that Involve the Inundation of Complex Landscapes *Coast. Eng. J.*, Vol. 57
- Briganti, R. and Dodd, N. and Kelly, D. M. and Pokrajac, D. 2012, An Efficient and flexible solver for the simulation of the morphodynamics of fast evolving flows on coarse sediment beaches. *Int. J. Numerical Methods in Fluids*, Vol 69, pp 859–877
- Kelly, D. M. and Dodd, N. 2010, Beach face evolution in the swash zone. *Journal of Fluid Mechanics*, Vol 661, pp. 316 – 340
- Kelly, D. M. and Dodd, N. 2009, Floating grid characteristics method for unsteady flow over a mobile bed. *Computers and Fluids*, Vol. 38(4), pp. 899 – 909

CONFERENCE PROCEEDINGS

- Chen, Q. and Zang, J and Kelly, D. M. and Dimakopoulos, A. S. 2017, A 3–D numerical study of solitary wave interaction with vertical cylinders using a parallelised Particle–In–Cell solver. In: 32nd International Workshop on Water Waves and Floating Bodies, Dalian, China.
- Chen, Q., Kelly, D. M., Spearman, J., Dimakopoulos, A., Zang, J. and Williams, C., 2015. CFD Modelling of Fall Pipe Rock Dumping Using PICIN. In: Proc. Coastal Sediments '15, San Diego, USA.
- Li, Y. and Kelly, D. M. and Li, M. and Harris, J. M. 2014, Development of a new 3D Euler–Lagrange model for the prediction of scour around offshore structures. In: 34th ASCE International Conference on Coastal Engineering, Seoul, Korea.
- Kelly, D. M. 2012, Full particle PIC modelling of the surf and swash zones. In: 33rd ASCE International Conference on Coastal Engineering, Santander, Spain.
- Kelly, D. M. and Dodd, N. and Knaapen, M. A. F. 2011, Modelling Tsunami Hydro– Morphodynamics For Real World Applications. In: EGU Geophysical Research Abstracts, Vienna, Austria.
- Kelly, D. M. and Dodd, N. and Knaapen, M. A. F. and Chesher, T. 2010, Swash zone modelling for engineering applications. In: 6th YCSE conference, London, United Kingdom.
- Kelly, D. M. and Dodd, N. 2008, Analysis of uncoupled beachface evolution in the swash zone. In: 31st ASCE International Conference on Coastal Engineering, Hamburg, Germany.

A more complete publication list can be found at: https://www.researchgate.net/profile/David_Kelly43

INTERESTS AND ACTIVITIES

My primary interests are restoring classic cars and motorcycles, walking and the outdoors.

REFERENCES

References are available upon request.