Qiang Chen

Coastal Research Specialist

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RESEARCH INTERESTS

- Hurricane-induced Coastal Flooding, Storm Surge, Wave Overtopping;
- Natural and Nature-based Coastal Defense, Mangroves;
- Wave-Structure Interaction;
- Renewable Wave and Wind Energy;
- Fallpipe Rock Dumping, Multiphase flow;
- CFD solver and NLSW equation solver development;
- High-performance computing, parallelization.

EDUCATION

2014 – 2017	**Ph.D. in Civil Engineering (Coastal and Ocean Engineering specialization)** **University of Bath, UK (co-supervised by HR Wallingford Ltd, UK)** • Scholarship: full scholarship • Thesis title: **Development of a full particle Particle-In-Cell (PIC) method for simulating nonlinear wave-structure interaction.**
2010 – 2013	**Master in Harbor, Coastal and Offshore Engineering** **Dalian University of Technology, China** • Thesis: Coupling effects of tank sloshing and ship motion • Outstanding Master Thesis of Dalian University of Technology
2006 – 2010	**Bachelor in Channel, Ports and Coastal Engineering** **Hohai University, China** • Ranked 6th of more than 220 students at graduation (equivalent to First Class Honors) • GPA 4.74 out of 5.0

WORKING EXPERIENCE

2022 – *present*	**Coastal Research Specialist, Florida International University, USA**
2019 – 2022	**Postdoctoral Research Associate, Florida International University, USA** Major work: • Improving the Coastal and Estuarine Storm Tide (CEST) model, with subgrid function, for storm surge and coastal flooding in research and insurance projects • Investigating mangrove/vegetation effect on storm surge mitigation using CEST • Applying the TELEMAC2D and TOMAWAC model for near-coast wave-current

interaction, storm surge, and coastal flooding simulations
- Developing a Computational Fluid Dynamics model for mixed flow-sediment dynamics
- Funding acquisition and research proposal writing

2017 – 2019

Postdoctoral Research Associate, University of Bath, UK
Major work:
- Further developing the 3D parallel Particle-In-Cell (PIC) Computational Fluid Dynamics model for fluid-structure interactions in coastal and ocean engineering applications (I am the developer of the world's first 3D parallel PIC model)
- Investigating the survivability of floating offshore wind energy devices under extreme storm conditions using CFD
- Investigating the performance of integrated Wave Energy Converters (WECs) and Floating Breakwaters using CFD
- Student training and supervising
- Research proposal writing

RESEARCH GRANTS (FUNDED)

2025– present

FIU/SFWMD Collaboration on FIU Coastal Environmental Data, Innovation, and Modeling Initiative (CEDIMI)
- Role: Co-PI (PI: Jayantha Obeysekera, FIU)
- Funded by: South Florida Water Management District, USA, 230k USD

2022– 2023

Fallpipe Rock Dumping R&D Study
- Role: PI
- Funded by: Norwegian Public Roads Administration, Norway, 100k USD

RESEARCH PROPOSALS (UNFUNDED)

2025

CAIG: Rapid Hurricane Vulnerability Assessment for Coastal Residential Structures through Physics-Guided AI and Reasoning
- Role: PI
- Submitted to: NSF, USA, 722k USD

RESEARCH EXPERIENCE

2023– present

Project "Florida Public Flood Loss Model" (Funded by the Florida Office of Insurance Regulation, USA)
- Senior Personnel;
- Contributions: storm surge modeling, project report, and academic paper writing.

2020– 2021

Project "Miami-Dade County Back Bay Coastal Storm Risk Management Feasibility Study Scope of Work for Hydrodynamic Modeling and Initial Water Quality Evaluations Supporting the Federal Feasibility Study" (Funded by USACE, USA)
- Senior Personnel;
- Contributions: numerical modeling of sediment transport (using TELEMAC), and project report and academic paper writing.

2019–2020	**Project "RAPID: Hurricane Irma: How do ecosystem perturbations interact to influence long-term resilience mechanisms?" (Funded by NSF, USA)** • Postdoctoral Research Associate • Contributions: development of a mangrove component within the CEST storm surge model, parallelization, and project report and academic paper writing.
2019	**Project "A CCP on Wave/Structure Interaction: CCP-WSI" (Funded by EPSRC, UK)** • Postdoctoral Research Associate • Contributions: participating in the UK CCP-WSI group blind tests of simulating wave interaction with wave energy converters and FPSOs using the 3D parallel Particle-In-Cell (PIC) model developed during my PhD study; academic paper writing.
2019	**Project "Investigation of Integration of Wave Energy Converter Arrays into Floating Breakwater" (Funded by Royal Academy of Engineering, UK)** • Postdoctoral Research Associate • Contributions: further development and application of the Particle-In-Cell (PIC) model for wave energy converters; additional funding application; academic paper writing; student supervising (Mr. Jonathan Birchall and PhD student Haoyu Ding at UoB).
2017–2019	**Project "Resilient Integrated-Coupled Wind and Wave Platform Design Methodology (RESIN)" (Joint UK-CHINA project, Funded by EPSRC, UK)** • Postdoctoral Research Associate • Contributions: further development of the Particle-In-Cell (PIC) model for simulating the hydrodynamic performance of floating offshore wind platforms; academic paper writing.

LIST OF JOURNAL ARTICLES

2024	Ding, H., **Chen, Q.** and Zang, J., 2024. Numerical simulation of wave interactions with floating offshore renewable energy structures: A comparative study between a Particle-based PIC model and OpenFOAM. *Journal of Fluids and Structures*, 126, p.104092.
2024	**Chen, Q.,** Li, Y., Kelly, D.M., Zhu, P., Rhome, J. and Fritz, C., 2024. Storm-tide and wave interaction at Puerto Rico during Hurricanes Irma and Maria. *Continental Shelf Research*, 277, p.105251.
2023	Ding, H., Zang, J., Jin, P., Ning, D., Zhao, X., Liu, Y., Blenkinsopp, C. and **Chen, Q.,** 2023. Optimization of the Hydrodynamic Performance of a Wave Energy Converter in an Integrated Cylindrical Wave Energy Converter-Type Breakwater System. *Journal of Offshore Mechanics and Arctic Engineering*, 145(5), p.054501.
2023	Sun, Y., Ning, D., Mayon, R. and **Chen, Q**., 2023. Experimental and numerical investigation on hydrodynamic performance of a 3D land-fixed OWC wave energy converter. *Applied Ocean Research*, 141, p.103805.
2023	**Chen, Q.,** Li, Y., Thiem, Ø.A., Neshamar, O. and Cuthbertson, A., 2023. Simulation of fallpipe rock dumping utilizing a multi-phase particle-in-cell (MPPIC)-Discrete Element Method (DEM) model. Part I: Concepts and formulation. *Applied Ocean Research*, 138, p.103654.

2023	Qian, Z., Wang, L., Zhang, C., Zhong, Z. and **Chen, Q.,** 2023. Conservation and accuracy studies of the LESCM for incompressible fluids. *Journal of Computational Physics*, 489, p.112269.
2023	Qian, Z., Wang, L., Zhang, C., Liu, Q., **Chen, Q**. and Lü, X., 2023. Numerical modeling of water waves with the highly efficient and accurate Lagrangian-Eulerian stabilized collocation method (LESCM). *Applied Ocean Research*, 138, p.103672.
2022	Qian, Z., Wang, L., Zhang, C. and **Chen, Q.,** 2022. A highly efficient and accurate Lagrangian--Eulerian stabilized collocation method (LESCM) for the fluid--rigid body interaction problems with free surface flow. *Computer Methods in Applied Mechanics and Engineering*, 398, p.115238.
2021	**Chen, Q.,** Li, Y., Kelly, D.M., Zhang, K., Zachry, B. and Rhome, J., 2021. Improved modeling of the role of mangroves in storm surge attenuation. *Estuarine, Coastal and Shelf Science*, 260, p.107515.
2021	Li, Y., **Chen, Q.,** Kelly, D.M. and Zhang, K., 2021. Hurricane Irma simulation at South Florida using the parallel CEST Model. *Frontiers in Climate*, 3, p.609688.
2021	Ransley, E.J., Brown, S.A., Hann, M., Greaves, D.M., Windt, C., Ringwood, J., Davidson, J., Schmitt, P., Yan, S. and Wang, J.X., **et al.,** 2021. Focused wave interactions with floating structures: A blind comparative study. *Proceedings of the Institution of Civil Engineers - Engineering and Computational Mechanics*, 174(1), pp.46–61.
2020	**Chen, Q.,** Zang, J., Birchall, J., Ning, D., Zhao, X. and Gao, J., 2020. On the hydrodynamic performance of a vertical pile-restrained WEC-type floating breakwater. *Renewable Energy*, 146, pp.414–425.
2020	Gao, J., He, Z., Zang, J., **Chen, Q**., Ding, H. and Wang, G., 2020. Numerical investigations of wave loads on fixed box in front of vertical wall with a narrow gap under wave actions. *Ocean Engineering*, 206, p.107323.
2020	Ransley, E., Yan, S., Brown, S., Hann, M., Graham, D., Windt, C., Schmitt, P., Davidson, J., Ringwood, J., Musiedlak, P.H., **et al.,** 2020. A blind comparative study of focused wave interactions with floating structures (CCP-WSI Blind Test Series 3). *International Journal of Offshore and Polar Engineering*, 30(1), pp.1–10.
2019	**Chen, Q**., Kelly, D.M. and Zang, J., 2019. On the relaxation approach for wave absorption in numerical wave tanks. *Ocean Engineering*, 187, p.106210.
2019	**Chen, Q.,** Zang, J., Ning, D., Blenkinsopp, C. and Gao, J., 2019. A 3D parallel particle-in-cell solver for extreme wave interaction with floating bodies. *Ocean Engineering*, 179, pp.1–12.
2019	**Chen, Q.,** Zhang, C., Zang, J. and Ning, D., 2019. A coupled Particle-In-Cell (PIC)-Discrete Element Method (DEM) solver for fluid--solid mixture flow simulations. *Journal of Fluids and Structures*, 91, p.102772.
2019	Gao, J., Zang, J., Chen, L., **Chen, Q.,** Ding, H. and Liu, Y., 2019. On hydrodynamic characteristics of gap resonance between two fixed bodies in close proximity. *Ocean Engineering*, 173, pp.28–44.
2019	Gao, J., He, Z., Zang, J., **Chen, Q.,** Ding, H. and Wang, G., 2019. Topographic

effects on wave resonance in the narrow gap between fixed box and vertical wall. *Ocean Engineering*, 180, pp.97–107.

2019	Li, J., Zang, J., Liu, S., Jia, W. and **Chen, Q.,** 2019. Numerical investigation of wave propagation and transformation over a submerged reef. *Coastal Engineering Journal*, 61(3), pp.363–379.
2019	Ransley, E., Yan, S., Brown, S.A., Mai, T., Graham, D., Ma, Q., Musiedlak, P.H., Engsig-Karup, A.P., Eskilsson, C., Li, Q., **et al.,** 2019. A blind comparative study of focused wave interactions with a fixed FPSO-like structure (CCP-WSI Blind Test Series 1). *International Journal of Offshore and Polar Engineering*, 29(2), pp.113–127.
2018	**Chen, Q.,** Zang, J., Kelly, D.M. and Dimakopoulos, A.S., 2018. A 3D parallel particle-in-cell solver for wave interaction with vertical cylinders. *Ocean Engineering*, 147, pp.165–180.
2018	Gao, J., Zhou, X., Zhou, L., Zang, J., **Chen, Q.** and Ding, H., 2018. Numerical study of harbor oscillations induced by water surface disturbances within harbors of constant depth. *Ocean Dynamics*, 68, pp.1663–1681.
2018	Gao, J., Zhou, X., Zang, J., **Chen, Q**. and Zhou, L., 2018. Influence of offshore fringing reefs on infragravity period oscillations within a harbor. *Ocean Engineering*, 158, pp.286–298.
2017	**Chen, Q.,** Zang, J., 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*, 29(5), pp.790–799.
2016	**Chen, Q.,** Kelly, D.M., Dimakopoulos, A.S. and Zang, J., 2016. Validation of the PICIN solver for 2D coastal flows. *Coastal Engineering*, 112, pp.87–98.
2016	**Chen, Q.,** Zang, J., Dimakopoulos, A.S., Kelly, D.M. and Williams, C.J.K., 2016. A Cartesian cut cell based two-way strong fluid-solid coupling algorithm for 2D floating bodies. *Journal of Fluids and Structures*, 62, pp.252–271.
2015	Kelly, D.M., **Chen, Q**. and Zang, J., 2015. PICIN: a particle-in-cell solver for incompressible free surface flows with two-way fluid-solid coupling. *SIAM Journal on Scientific Computing*, 37(3), pp.B403–B424.

LIST OF CONFERENCE PAPERS/ABSTRACTS

2023	**Chen, Qiang**, Li, Yuepeng, Kelly, David and Zhu, Ping, 2023. Storm-tide and wave interaction at Puerto Rico during Hurricanes Irma and Maria: Results from coupled TELEMAC2D and TOMAWAC simulation. *TC Operations and Research Forum/Interdepartmental Hurricane Conference, Miami, USA*.
2022	**Chen, Qiang**, Li, Yuepeng, Kelly, David and Kurum, M. Onur, 2022. Inland, storm surge, and wave compound flooding simulation of hurricanes Irma and Maria at Puerto Rico. *Ocean Science Meeting 2022, Online*.
2021	**Chen, Qiang**, Li, Yuepeng, Kelly, David and Zhou, Linlin, 2021. Numerical Modeling of the Role of Mangroves in Storm Surge Attenuation Utilizing TELEMAC2D. *CERF 2021: 26th Biennial Conference, Online*.

2019	**Chen, Qiang** and Zang, Jun, 2019. Application of a hybrid Eulerian-Lagrangian PIC model to focused wave interaction with WEC-type floating bodies. *European Wave & Tidal Energy Conference 2019: EWTEC 2019, Napoli, Italy*.
2019	Ding, Haoyu, Zang, Jun, Ning, Dezhi, Zhao, Xuanlie, **Chen, Qiang**, Blenkinsopp, Chris and Gao, Junliang, 2019. Evaluation of the performance of an integrated WEC type of breakwater system. *International Conference on Offshore Mechanics and Arctic Engineering, Glasgow, UK*, OMAE2019-95739, V009T12A002.
2019	Ding, Haoyu, Zang, Jun, Blenkinsopp, Chris, Ning, Dezhi, Zhao, Xuanlie, **Chen, Qiang** and Gao, Junliang, 2019. Numerical investigation of the performance of a pile-restrained WEC-type dual-floating breakwater system. *The 34th International Workshop on Water Waves and Floating Bodies, Newcastle, Australia*.
2019	Gao, Junliang, He, Zhiwei, Zang, Jun, **Chen, Qiang** and Ding, Haoyu, 2019. Numerical study of the wave forces on a fixed box during gap resonance. *The 34th International Workshop on Water Waves and Floating Bodies, Newcastle, Australia*.
2018	**Chen, Qiang** and Zang, Jun, 2018. Numerical modelling of focused wave impact with a fixed FPSO-like structure using a particle-in-cell solver. *ISOPE International Ocean and Polar Engineering Conference, Sapporo, Japan*, ISOPE, ISOPE-I-18-013.
2018	**Chen, Qiang**, Zang, Jun, Zhao, Xuanlie and Ning, Dezhi, 2018. Numerical study of the hydrodynamic performance of a pile-restrained WEC-type floating breakwater. *The 33rd International Workshop on Water Waves and Floating Bodies, Guidel-Plages, France*.
2018	Li, Jinxuan, Zang, Jun, Liu, Shuxue, Jia, Wei and **Chen, Qiang**, 2018. Numerical simulation of wave propagation over submerged reef. *The 33rd International Workshop on Water Waves and Floating Bodies, Guidel-Plages, France*.
2017	**Chen, Qiang**, Zang, Jun, Kelly, David and Dimakopoulos, Aggelos, 2017. A 3D numerical study of solitary wave interaction with vertical cylinders using a parallelised Particle-In-Cell solver (Conference). *The 32nd International Workshop on Water Waves and Floating Bodies, Dalian, China*.
2015	**Chen, Qiang**, Zang, Jun, Kelly, David, Williams, Christopher and Dimakopoulos, Aggelos, 2015. Particle--In--Cell numerical solver for free surface flows with fluid--solid interactions. *The 30th International Workshop on Water Waves and Floating Bodies, Bristol, UK*.
2015	**Chen, Qiang**, Kelly, David M, Spearman, Jeremy, Dimakopoulos, Aggelos, Zang, Jun and Williams, Chris JK, 2015. CFD modelling of fall pipe rock dumping using PICIN. *The Proceedings of the Coastal Sediments 2015, San Diego, USA*. World Scientific.

PHD THESIS

2017	Chen, Q. 2017. *Development of a full particle PIC method for simulating nonlinear wave-structure interaction*. PhD thesis, University of Bath.

JOURNAL REVIEWER

- Applied Energy
- Applied Ocean Research
- Applied Science
- Journal of Marine Science and Application
- Mathematics
- Ocean Modelling
- Renewable Energy
- ASME Journal of Offshore Mechanics and Arctic Engineering
- Computer Methods in Applied Mechanics and Engineering
- Frontiers in Marine Science
- Limnology and Oceanography
- Marine Pollution Bulletin
- Ocean Engineering
- Physics of Fluids

CONFERENCES

2024	Tropical Cyclone Operations and Research Forum 2024, USA
2023	Tropical Cyclone Operations and Research Forum 2023, USA
2022	Ocean Science Meeting 2022, online
2021	The 26th Coastal And Estuarine Research Federation, online
2019	The 13th European Wave and Tidal Energy Conference, Italy
2018	The 33rd International Workshop on Water Waves and Floating Bodies, France
	The 28th International Ocean and Polar Engineering Conference (ISOPE), Japan
2017	The 32nd International Workshop on Water Waves and Floating Bodies, China
2015	Coastal Sediments 2015, USA
	The 30th International Workshop on Water Waves and Floating Bodies, UK

HONOURS & AWARDS

2022	Winner of the 2022 Sir Benjamin Baker Award as a co-author of the paper "Focused wave interactions with floating structures: a blind comparative study". Awarded by ICE Publishing, 2022.
	Co-Chair of section CP05 Storm-induced Coastal Impacts: Prediction, Monitoring, Response, and Mitigation at the Ocean Science Meeting 2022
2015	Santander Travel Bursary application award (1000 GBP), by the University of Bath
2014	Full scholarship for PhD study by the University of Bath and HR Wallingford Ltd
2013	Outstanding Master Thesis of the Dalian University of Technology, China
2006 - 2010	Award for Outstanding Study (four times), by Hohai University, China

TEACHING EXPERIENCE

- Undergraduate student supervising, University of Bath, UK
  - Time period: three hours per week for five weeks
  - Student: Ms. Pan Yue (3rd year, 2015); Mr. Jonathan Birchall (3rd year, 2018)

- Lab demonstrator, University of Bath, UK

➢ Time period: three hours per week for ten weeks, 2015
➢ Student: 2nd year undergraduates (~ 30 students)

RESEARCH SKILLS

- **Coding language**: FORTRAN, Matlab, C/C++, MPI Libraries;

- **Numerical algorithm/theory**: finite-difference, finite-volume, and scattered particles based Navier-Stokes solver coding from scratch, CFD, MPI parallelization, advection-diffusion equation, NLSW equation solver, subgrid approach, cut cell method, semi-Lagrangian method, wave generation and absorption, rigid-body motion equation, potential flow theory;

- **Software**: ArcGIS Pro, TELEMAC, SPHysics, OpenFOAM, BlueKenue, SLAOME, Paraview, Tecplot, QtiPlot, AutoCAD.