



Shan Zou, Ph.D.



Experience Profile

Shan Zou, Ph.D., is a research scientist at the Water Institute and has 20 years of experience in coastal resiliency, restoration, and protection. Dr. Zou has extensive experience in numerical modeling for hydrodynamic, wave, and sediment transport and was the primary developer of Smoothed Particle Hydrodynamics (SPHysics) model for waves and sediment transport application. He has extensive experience in hydraulic and hydrologic modeling systems for flood plain and risk analysis.

Professional Experience

The Water Institute of the Gulf

- *Research Scientist: Modeling* 2020 – Present

Arcadis, US, Inc.

- *Senior Engineer* 2019 – 2020
- *Project Engineer* 2011 – 2019
- *Staff Engineer* 2009 – 2011

Everest International Consultants, Inc.

- *Engineer* 2007 – 2009

Nanjing Hydraulic Research Institute

- *Research Assistant* 1997 – 2000
- *Assistant Engineer* 1993 – 1997

Selected Projects

Coastal Master Plan 2012, 2017 (2010-2017)

Louisiana's Coastal Master Plan is a 50-year, \$50 billion overarching plan to guide coastal restoration and protection for south Louisiana. The plan which includes extensive hydrologic and sediment modeling, is redone every five (now six) years to incorporate the latest scientific findings.

Lower Barataria Sediment Diversion (Ongoing)

Sediment diversions are cornerstone projects of Louisiana's Coastal Master Plan, essential to creating and sustaining coastal land in perpetuity. The planning for this new concept includes hydrologic and sediment numerical modeling to determine sediment and water movement over time.

Inner Harbor Navigation Canal (IHNC) Surge Barrier Study (2012)

In the billions of restoration and protection work done around the New Orleans metro area, the U.S. Army Corps of Engineers included a 1.8-mile-long surge barrier located at the confluence of the Gulf Intracoastal Waterway and the Mississippi River Gulf Outlet. Worked on the study that informed the design and construction.

Comite River Diversion Project (2009 - 2019)

Participated in the work to inform the design of a 12-mile-long diversion canal that will provide flood relief in East Baton Rouge Parish by connecting the Comite River to the Mississippi River.

Company Role

Research Scientist: Modeling

Project Role / Focus Areas

- Coastal, hydraulic, and hydrologic engineering
- Wave and sediment transport numerical modeling
- Disaster preparedness and response
- Flood plain and risk analysis

Education

- Ph.D. – Civil Engineering, Johns Hopkins University - 2007
- M.S. – Civil Engineering, University of Delaware - 2003
- B.S. – Physical Oceanography, Ocean University of China - 1993

Professional Membership

- EIT (2005)

Selected Projects (cont.)

FEMA flooding risk mapping (2009 - 2015)

Worked with FEMA to update flood risk mapping in multiple states and jurisdictions (Mid-Atlantic, NY, NJ, FL, TX, LA). Developed and applied numerical models for RiskMap development and served as technical review team member.

Pipeline Scour Analysis and Protection Designs (2012 - 2019)

Used numerical modeling to analyze wave and current movements that can lead to undermining and compromise oil and gas infrastructure. In addition, modeling potential protection designs to determine best effective measures to prevent scour.

Coastal Flooding Mitigation Measures (2014)

Provided the coastal and riverine flood risk assessment for the properties over the NYNJ areas. Conducted the hydrodynamic models such as storm surge flow model and advanced water wave to evaluate preliminary design conditions and results for benefit-cost analysis for the proposed flood mitigation structures for hospitals, PowerGen assets, sewage authorities, etc.

Living Breakwaters Design and shoreline Stability Study (2015 - 2020)

Developed a series of hydrodynamic, water waves, sediment transport and shoreline evolution models to design and optimize the Living Breakwater system along the southern Staten Island. The models were also used for impact analysis and shoreline restoration after Hurricane Sandy. This project is in phase of issued for construction (IFC) in 2020.

Selected Publications

1. Z. Cobell, H. Zhao, H.J. Roberts, F.R. Clark, and **S. Zou**. Surge and Wave Modeling for the Louisiana 2012 Coastal Master Plan. Journal of Coastal Research: Special Issue 67 - Louisiana's 2012 Coastal Master Plan Technical Analysis, pages 88, 108, 2013
2. Atkinson, J, H. Roberts, S. Hagen, **S. Zou**, P. Bacopoulos, S. Medeiros, J. Weishampel, Z. Cobell, "Deriving Frictional Parameters and Performing Historical Validation for an ADCIRC Storm Surge Model of the Florida Gulf Coast", Florida Watershed Journal, 2011.
3. Dalrymple, R.A., M. Gómez-Gesteira, B.D. Rogers, A. Panizzo, **S. Zou**, A.J.C. Crespo, G. Cuomo, and M. Narayanaswamy. "Smoothed Particle Hydrodynamics for Nonlinear Water Waves" in Advances in Numerical Simulation of Nonlinear Waves, Q. Ma, ed., World Scientific Press, 2008.
4. **Zou, S.**, and R.A. Dalrymple. "Sediment Suspension Modeling by Smoothed Particle Hydrodynamics". 29th Intl. Conference on Coastal Engineering. World Scientific Press, 2004.
5. Chen, Guoping, S. Qiao, J. Du, and **S. Zou**. Wind Wave Spectrum Estimation by the Maximum Entropy Method. Journal of Nanjing Hydraulic Research Institute, 1999.

Selected Conference Proceedings and Presentations

1. **Zou, S.**, Wave model applications for flood mitigation design, invited presentation in FUNWAVE workshop, University of Delaware, 2017.
2. **Zou, S.**, H. Roberts, J. Atkinson, B. Blanton, L. Stillwell, J. Hanson, M. Forte, and R. Luetlich, "Mesh Development of an ADCIRC Storm Surge Model for the Mid-Atlantic Region", American Water Resources Association Annual Conference, 2010
3. **Zou, S.**, and R. A. Dalrymple. "Numerical Simulation of Sediment Suspension Under Oscillatory Flow by SPH-SPS Method". 30th Intl. Conference on Coastal Engineering. World Scientific Press, 2006.
4. **Zou, S.**, and R.A. Dalrymple. "Smoothed Particle Hydrodynamics Simulation on Sediment Suspension Under Breaking Waves". Symposium on Ocean Wave Measurements and Analysis. ASCE, 2005.
5. Dalrymple, R.A., O. Knio, D.T. Cox, M. Gesteira, and **S. Zou**. "Using a Lagrangian Particle Method for Deck Overtopping". Proc. Waves 2001. ASCE, 2001.