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Cindy Wang, Ph.D.

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Professional Profile

Dr. Wang uses her expertise in fluid mechanics to solve complex environmental problems involving contaminant fate and transport. She specializes in the study of mixing, flow, and transport processes via laboratory and field experiments as well as analytical and numerical modeling.

Dr. Wang's project experience involves deep-sea oil spills, deep-sea mining, waste effluent discharge, land reclamation, and environmental impact assessments of global shipping discharge to water.

Her work has elucidated key physical factors, processes governing fate and transport of oil droplets released from blowouts into the water environment as affected by the subsurface application of dispersants. She has also developed analytical model and employed numerical model to assess the potential environmental impact of mining residual disposal technique and developed a dispersion model for assessing the impacts of shipping discharges on water quality and marine organisms. Additionally, she has designed and executed lab studies for understanding particle dynamics during open-water release of particle plumes relevant to land reclamation and dredging activities.

Her specific skill sets involve developing models to evaluate mixing, dispersion, and dilution rates of multiphase discharges; using numerical models such as the Environmental Fluid Dynamics Code (EFDC) for this application; oil spill modelling using the Texas A&M Oil Spill Calculator (TAMOC); designing and conducting laboratory and field experiments for investigating contaminant fate and transport processes; analyzing field data to evaluate sediment transport.

Academic Credentials & Professional Honors

Ph.D., Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), 2019

M.S., Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), 2016

B.Eng., Civil and Resource Engineering, The University of Western Australia, 2013

Prior Experience

Post-doctoral Associate, Massachusetts Institute of Technology (MIT), 2019

Research Assistant, Singapore-MIT Alliance for Research and Technology (SMART), 2016, 2017, 2018

Research & Development Officer, Water Corporation Western Australia, Asset Management Branch, 2012

Publications

Wang D, Adams EE. Secondary Intrusion Formation of Multiphase Plumes. Front Mar Sci. 2021;8:617074. doi:10.3389/fmars.2021.617074.

Wang D, Adams EE, Munoz-Royo C, et al. Effect of crossflow on trapping depths of particle plumes: laboratory experiments and application to the PLUMEX field experiment. Environ Fluid Mech. 2021;21(4):741-757. doi:10.1007/s10652-021-09795-5.

Muñoz-Royo C, Peacock T, Alford MH, et al. Extent of impact of deep-sea nodule mining midwater plumes is influenced by sediment loading, turbulence and thresholds. Commun Earth Environ. 2021;2(1):148. doi:10.1038/s43247-021-00213-8.

Kasseris E, Wang D, Zhang Y, Adams E E, Heywood J. Evaluation and harmonization of rules and guidance on the discharge of liquid effluents from EGCS into waters, including conditions and areas. International Maritime Organization (IMO) Marine Environment Protection Committee (MEPC) 75th Session, London, United Kingdom.

Wang D, Adams EE. Intrusion Dynamics of particle plume in stratified water with weak crossflow: Application to deep ocean blowouts. J Geophys Res Oceans. 2016;121:1-16. doi:10.1002/2015JC011324.

Wang D, Adams EE, Chow A. Predicting the Trap Elevation of Small Droplets from the Deepwater Horizon Blowout under Conditions of Weak Crossflow. In: Proceedings of International Symposium on Outfall Systems. Ottawa, Canada: May 10-13, 2016.

Wang D, Adams EE. Intrusion Dynamics of Small Oil Droplets Released from a Deep Ocean Blowout. In: Proceedings of 36th IAHR World Congress. The Hague, the Netherlands: June 28 - July 3, 2015.

Wang D. Framework to Manage Long Term Performance of Asbestos-Cement. OzWater 2013 Conference Proceedings, Perth, Australia, May 24, 2013.

Presentations

Wang D, Adams EE, Zhang Y, Heywood J, Kasseris E. Assessing The Environmental Impacts of Exhaust Gas Cleaning System (EGCS) Discharges from Seagoing Vessels. AGU Fall Meeting, New Orleans, LA, 2021.

Wang D, Jalalizadeh M, Kane Driscoll SB, McGrath J. Environmental Risk Assessment of Marine Scrubber Effluent Discharge. SETAC North America 41st Annual Meeting, Virtual, 2020.

Wang D, Adams EE. Intrusion Dynamics of Particles Released Continuously to the Deep Ocean. Invited talk, Coastal Ocean Fluid Dynamics Laboratory (COFDL) Seminar at Woods Hole Oceanographic Institution (WHOI), MA, 2019.

Wang D, Adams EE., Chow A. Sensitivity Analysis of Trap Elevation of Small Droplets to Independent Parameters. Gulf of Mexico Oil Spill and Ecosystem Science Conference, Tampa, FL, 2016.

Wang D. Understanding the Intrusion Layer from the Deepwater Horizon Spill. Oral presentation, 68th Annual Meeting of the APS - Division of Fluid Dynamics, Boston, MA, 2015.

Project Experience

Provided a technical assessment to International Maritime Organization (IMO) on the effectiveness of Exhaust Gas Cleaning Systems in meeting emission limits.

Delivered technical assessments using field experiments, analytical techniques, and numerical modeling to evaluate the potential environmental impacts of disposal techniques for mining residuals to inform guideline development for sustainable mining operations.

Bridged a gap in fundamental spill knowledge and developed a model to predict the fate of accidentally spilled oil to assess the effectiveness of chemical dispersants as a remediation tool.

Devised a data-informed asset management framework for guiding preventative maintenance of state water infrastructure.

Additional Education & Training

Attended the 2019 Fluids and Health Conference & Summer School, Corsica, France, July 23 - August 2, 2019.

LabVIEW Associate Developer Training in 2017.

Peer Reviews

International Journal of Multiphase Flow