

# Xiaofeng Liu | Associate Professor PhD, PE

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## Education

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<b>University of Illinois at Urbana-Champaign</b> <i>Ph.D. in Civil Engineering</i>	<b>USA</b> 2008
<b>University of Illinois at Urbana-Champaign</b> <i>M.S. in Applied Mathematics</i>	<b>USA</b> 2007
<b>Peking University</b> <i>M.S. in Environmental Science</i>	<b>China</b> 2003
<b>Tsinghua University</b> <i>B.E. in Hydraulic Engineering (minor: Computer Science)</i>	<b>China</b> 2000

## Professional Registration

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**State of Texas:** Professional Engineer (License number: 110079)

## Professional Experience

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**2019–Present:** Associate Professor, Dept. of Civil and Environmental Engineering and Institute of Computational and Data Sciences, Penn State University

**2014–2019:** Assistant Professor, Dept. of Civil and Environmental Engineering and Institute of Cyber-Science, Penn State University

**2010–2013:** Assistant Professor, Dept. of Civil and Environmental Engineering, University of Texas at San Antonio

**2009.6–2010.1:** Visiting Research Assistant Professor, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

**2008–2009.5:** Postdoctoral Research Associate, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

**2003–2008:** Research Assistant, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

**2006.7:** Summer Intern, Illinois State Water Survey

## Awards and Honors

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**2024:** Fellow of Environmental and Water Resources Institute (EWRI) of ASCE

**2023:** Second Place (\$85,000 prize), Phase II of U.S. Bureau of Reclamation Divide and Conquer Challenge for River Modeling

**2022:** Third Place (\$20,000 prize), Phase I of U.S. Bureau of Reclamation Divide and Conquer Challenge for River Modeling

**2020:** State of the Art of Civil Engineering Award, ASCE

**2020:** Harry West Teaching Award, Penn State CEE

## Fellowships and Scholarships

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**2022:** Visiting Professor Scholarship, German Academic Exchange Service (DAAD)

**2003:** Honored Graduate Student, Peking University, Beijing, China

**2003:** Guanghua Scholarship, Peking University, Beijing, China

**2002:** Wusi Fellowship, Peking University, Beijing, China

**2001:** Guanghua Scholarship, Peking University, Beijing, China

**1999:** Excellent Student Award II, Tsinghua University, Beijing, China

**1996:** Excellent Student Award III, Tsinghua University, Beijing, China

## Research Funding

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### External Funding

**2024–2025:** Local scour around bridge piers, PI (100% credit), \$188,226, FHWA (through Genex)

**2024–2025:** Two-dimensional computational hydraulics modeling and automation, PI (100% credit), \$20,000, FHWA (through Genex) (contract in negotiation)

**2023–2026:** Harnessing Physics-Informed Machine Learning to Improve Image-Based Streamflow Measurements, PI (55% credit), \$300,024, USGS

**2023–2026:** PFI-RP: Novel coated geotextile to enhance water drainage from soil, PI at Penn State (Lead PI: Jie Han at University of Kansas), \$549,996 (Penn State \$127,460, 100% credit), NSF

**2019–2023:** Nature-based solutions for river restoration, PI (100% credit), \$297,791, NSF (no cost extension to 2024)

**2023–2024:** Mentoring Institute for Sediment Transport (MIST) for Early Career Professionals, PI at Penn State (Lead PI: Jennifer Duan at University of Arizona), NSF

**2021–2022:** In-situ stiffening and upgrading of ballasted rail track beds via cement grout injection, co-PI (PI: Farshad Rajabipour), \$279,457 (30% credit), CIAMTIS, U.S. DOT Region 3 University Transportation Center (no cost extension to 2023)

**2020–2023:** Guidelines for selection and application of Manning's roughness values in two-dimensional hydraulics models, PI, \$499,995 (100% credit), NCHRP

**2020–2021:** Evaluation of dust suppressants used on gravel roads – Water quality impacts and dust suppression efficacy, co-PI (PI: Bill Burgos), \$102,176 (20% credit), PA Department of Environmental Protection

**2017–2020:** Nature-like fish passage design for the York Haven Hydroelectric Dam, PI, (co-PIs: Johnson, P. A. and Ferreri, C. P.), \$600,000 (50% credit), Cube Hydro Partners (no-cost extension to 2021)

**2017–2020:** Respiration in hyporheic zones: connecting mechanics, microbial biogeochemistry, and models, PI, \$240,000 (100% credit), DoE (through UT Austin) (no-cost extension to 2021)

**2017–2020:** Three-dimensional computational modeling of turbulent flow field, bed morphodynamics and liquefaction adjacent to munitions, PI, (co-PI: Tong Qiu), \$354,379 (60% credit), SERDP (no-cost extension to 2021)

**2017–2020:** Robust ecohydraulic 3D modeling tools for rivers with complex instream structures, PI, \$180,000 (100% credit), U.S. Bureau of Reclamation

**2017–2020:** Impact of oil & gas wastewater disposal on lake and river Sediments, co-PI (PI: Burgos, W. D., other co-PIs: Warner, N. R., Drohan, P. J., Vanden Heuvel, J. P., and Dorman, F. L.), \$330,000 (15% credit), NSF

**2020–2021:** Evaluation of erodibility of sand infill placed in synthetic grass, Phase 6, co-PI (PI: Hassan Ismail), \$48,638 (20% credit), Watershed Geosynthetics LLC

**2020:** Evaluation of erodibility of sand infill placed in synthetic grass, Phase 5, co-PI (PI: Hassan Ismail), \$18,000 (20% credit), Watershed Geosynthetics LLC

**2020:** Evaluation of erodibility of sand infill placed in synthetic grass, Phase 3, co-PI (PI: Ming Xiao), \$18,378 (25% credit), Watershed Geosynthetics LLC

**2020:** Evaluation of erodibility of sand infill placed in synthetic grass, Phase 2, co-PI (PI: Ming Xiao), \$16,444 (30% credit), Watershed Geosynthetics LLC

**2019–2020:** Evaluation of erodibility of sand infill placed in synthetic grass, Phase 1, co-PI (PI: Ming Xiao), \$91,756 (30% credit), Watershed Geosynthetics LLC

**2019–2020:** GRS-IBS specification modification, co-PI (50%; PI: Xiao, M.), \$99,594 (50% credit), PennDOT

**2015–2017:** Collaborative Research: Visualization, analysis, and HPC modeling of subglacial hydrology from high-resolution 3D conduit scans acquired with a novel sensor, PI, \$272,356 (60% credit), NSF

**2014–2016:** Quantitative modeling tools of scour and morphological impact due to large wood debris structures, \$170,000 (100% credit), PI, Bureau of Reclamation (no-cost extension to September 2017)

**2015:** Assignment agreement of Intergovernmental Personnel Act (IPA): modeling of scour and soil erodibility test apparatus, \$41,754 (100% credit), PI, U.S. Army Corps of Engineers

**2013–2015:** Pore-scale modeling of turbulent flows with realistic and physically correct particle arrangement, \$138,979 (100% credit), PI, U.S. Army Corps of Engineers

**2012–2013:** CNIC: U.S.-Danish research planning visit to catalyze computational and experimental research on scour protection of offshore wind farms, \$19,654 (100% credit), PI, NSF

**2011–2013:** Assessment of the effects of regional channel stability and sediment transport on roadway hydraulic structures, \$248,247 (80% credit), PI, (co-PIs: Hatim Sharif (UTSA), Sazzad Bin-Shafique (UTSA), Jean-Louis Briaud (TAMU), Kyle Strom (UH), Keh-Han Wang (UH)), Texas DOT

**2010–2012:** Empirical flow parameters-A tool for hydraulic model validity assessment, \$519,485 (20% credit), co-PI, (PI: Theodore Cleveland, Texas Tech University), Texas DOT

**2010–2011:** Synthesis of hydrologic and hydraulic impacts, \$50,000 (30% credit), co-PI (PI: Hatim Sharif, University of Texas at San Antonio), Texas DOT

**2009:** Two-dimensional modeling of hydrodynamics, sediment transport, bed scour and armoring in St. Clair River, \$76,000 (40% credit), co-PI (PI: G. Parker), International Joint Commission, International Upper Great Lakes Study

### Internal Funding

**2024–2025:** Data Science and AI for Civil and Environmental Engineering, PI, \$84,328 (40% credit), Penn State College of Engineering Leonhard Center

**2020:** Solving surface shallow water equations using machine learning algorithms, PI, \$30,000 (60% credit), Penn State Institute of Computational and Data Sciences

**2015:** 3D data acquisition and 3D printing to construct “Digital Twins” for water and biogeochemical research, PI, \$25,000 (40% credit), PSIEE, Penn State University

**2011–2012:** Foundation protection of offshore renewable energy infrastructures, PI, \$22,000 (100% credit), TRAC program of UTSA

**2011–2012:** Flow accounting for the Cibolo Creek, Boerne, Texas, PI, \$3,000 (100% credit), UTSA

**2012:** Two-day workshop on hydraulics and sediment transport modeling for the San Antonio River Authority (SARA), \$2,500 (100% credit)

## Student and Postdoc Advisees

### PhD Students Advised

**11:** Tenorio, A. (Co-advised with Dr. Roberto Fernandez). *Machine-learning enhanced flow measurements with imaging technology*. Stage of Completion: In Progress. Funding Source: USGS. (January 1, 2024 - Present)

**10:** Li, Y. *Bridge hydraulics and scour experiments and modeling*. Stage of Completion: In Progress. Funding Source: FHWA. (January 1, 2023 - Present)

**9:** Radiyan, F. *Modeling of large woody debris in rivers*. Stage of Completion: In Progress. Funding Source: Fulbright Scholarship. (August 2021 - Present)

- 8:** Mousavi, A. *Scour and erosion around porous in-stream structures*. Stage of Completion: In Progress (Defending in Fall 2024). Funding Source: NSF. (August 2020 - Present)
- 7:** Song, Y. *Three-dimensional computational modeling of turbulent flow field and bed morphodynamics adjacent to munitions*. Stage of Completion: Completed (Now Postdoc at Penn State). Funding Source: SERDP. (August 15, 2017 - May 1, 2022)
- 6:** Li, B. *Modeling of hyporheic flow*. Stage of Completion: Completed (Now Postdoc at Pacific Northwest National Lab). Funding Source: DOE. (June 2018 - December 31, 2021)
- 5:** Zeng, Y.-X. *Nature-like fish passage design for the York Haven Hydroelectric Dam*. Stage of Completion: Completed (Now at West Consultant). Funding Source: Cube Hydro, LLC. (August 15, 2017 - December 31, 2021)
- 4:** Xu, Y. *Morphodynamic impact of large woody debris*. Stage of Completion: Completed (Now Associate Professor at China Agriculture University). Funding Source: U.S. Bureau of Reclamation. (August 15, 2014 - May 1, 2019)
- 3:** Chen, Y. *Computational modeling of subglacial conduit drainage*. Stage of Completion: Completed (Now Scientist at Pacific Northwest National Lab). Funding Source: NSF. (August 15, 2014 - May 1, 2018)
- 2:** Nayamatullah, M. M. M. *Semi-analytical and numerical study of suspended sediment transport in open channel*. Stage of Completion: Completed (Now at Arcadis). Funding Source: Startup. (August 15, 2012 - August 1, 2015). Note: I was his former Ph.D. thesis advisor. Then he was supervised by a delegate faculty member at the University of Texas at San Antonio after I moved Penn State.
- 1:** Jiang, Y. *Experimental and numerical investigation of density current over rough bottoms and uneven bedforms*. Stage of Completion: Completed (Now at Corning). August 15, 2011 - December 5, 2014. Note: I was his former Ph.D. thesis advisor. Then he was supervised by a delegate faculty member at the University of Texas at San Antonio after I moved Penn State.

#### MS Students Advised.....

- 4:** Li, Z. (Co-advised with Dr. Tong Qiu). *Three-dimensional computational modeling of granular material behavior and liquefaction adjacent to munitions*. Stage of Completion: Completed. Funding Source: SERDP. (August 15, 2017 - December 15, 2019)
- 3:** Talebpour, M. *Effect of roughness on secondary current in open channels*. Stage of Completion: Completed (Now Postdoc at Johns Hopkins University). Funding Source: Startup. (January, 2014 - May 2016)
- 2:** Ashraf, R. *Channel stability and its impact on transportation infrastructures*. Stage of Completion: Completed (Now Assistant Professor at Bradley University). Funding Source: TxDOT. (2011 – 2013)
- 1:** Sinir R. *Pore-scale modeling of scour protection for offshore wind farms*. Stage of Completion: Completed. Funding Source: Startup. (2011 – 2013)

#### Honor and Undergraduate Students Advised.....

- 3:** Deitrick, A. *Flume experiment for fish passage design*. Stage of Completion: Completed (Now PhD student at Penn State). Funding Source: Cube Hydro, LLC. (August 1, 2018 - May 1, 2020)
- 2:** Lu, S. (Student in Computer Science, IST, Penn State University). *Coupling OpenFOAM with external program*. Stage of Completion: Completed. Funding Source: College of Engineering REU program. (January 15, 2018 - May 1, 2018)
- 1:** Luna, R. (Student in Mechanical Engineering, Penn State University). *Computational and Physical Modeling of Large Woody Debris*. Stage of Completion: Completed. Funding Source: Penn State College of Engineering REU program. (May 2015 - August 2015)

#### Postdocs Advised.....

- 2:** Mahdavi Mazdeh, A., PhD. *Manning's n in 2D computational hydraulics models*. Stage of Completion: Completed (Now at AtkinsRealis). Funding Source: NCHRP. (June 1, 2021 - May 7, 2023)
- 1:** Ismail, H. *Nature-like fish passage for the York Haven Hydropower Dam*. Stage of Completion: Completed (Now at McCormick Taylor). Funding Source: Cube Hydro, LLC. (January 1, 2018 - January 15, 2021)

## Awards for Student and Postdoc Advisees

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Liyan Li, NSF Mentoring Institute for Sediment Transport Research (MIST) Travel Award, 2024  
Azadeh Mousavi, ASCE J. Waldo Smith Hydraulic Fellowship, 2023  
Autumn R. Deitrick, NSF Graduate Research Fellowship, 2020  
Autumn R. Deitrick, Barry Goldwater Scholar, 2020  
Autumn R. Deitrick, Erickson Discovery Grant, 2019  
Autumn R. Deitrick, 1st Place Excellence in Information Literacy, Penn State Undergraduate Exhibition  
Hassan Ismail, Lightning Talk Competition (2nd place) 13th Annual Postdoc Exhibition, 2020  
Hassan Ismail, Poster Competition (2nd place) 13th Annual Postdoc Exhibition, 2020  
Hassan Ismail, Lightning Talk Audience Prize, 11th Annual Postdoc Exhibition, 2018  
Hassan Ismail, Poster Competition (1st place) 11th Annual Postdoc Exhibition, 2018

## Editorial Responsibilities

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**2015–Present:** Associate editor, *Journal of Hydraulic Engineering*, ASCE

**2018–2022:** Guest editor, *Journal of Environmental Engineering*, ASCE

**2020–2022:** Guest editor, *Journal of Irrigation and Drainage Engineering*, ASCE

**2019:** Co-editor of ASCE book *Computational Fluid Dynamics: Applications in Water, Wastewater, and Stormwater Treatment*

## Journal Publication Reviewer

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- Journal of Geophysical Research
- Advances in Water Resources
- Journal of Engineering Mechanics
- Ecological Modeling
- Journal of Hydraulic Engineering
- Coastal Engineering
- International Journal of Sediment Research
- Computer and Geosciences
- Journal of Waterway, Port, Coastal, and Ocean Engineering
- Geophysical Research Letters
- Physics of Fluids
- European Journal of Mechanics
- Journal of Sediment Research
- Journal of Hydrology
- Water Resources Research
- Journal of Hydraulic Research
- Proceedings of the Institution of Civil Engineers journal Water Management
- Energies
- Journal of Hydrological Engineering
- International Journal of Numerical Methods in Fluids
- Computer and Fluids
- Journal of American Society of Agricultural and Biological Engineers
- Water
- Great Lakes Research
- Environmental Fluid Mechanics
- Ecological Engineering
- Earth Surface Processes and Landforms
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## Conference Paper Reviewer

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- The 9th International Symposium on Environmental Hydraulics, 2021
- ASCE EWRI Congress 2010-present
- CMWR 2012
- GeoCongress 2014
- RCEM 2015
- ICSE 2018, 2020

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- 5th Joint US-European Fluids Engineering Division Summer Meeting 2018
- OpenFOAM Workshop 2020
- 10th International Conference on Scour and Erosion

## Proposal and Project Reviewer

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- NSF
- Delaware Sea Grant Research
- Penn State University Institute of CyberScience Seed Grant
- Penn State University Institutes of Energy and the Environment Seed Grant
- Penn State University Transportation Center
- Luxembourg National Research Fund (FNR)

## Refereed Journal Papers

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(§ denotes student advised, \* denotes postdoc.)

- 59:** B. Li<sup>§</sup>, M. B. Cardenas, X. Chen, and **X. Liu** (2024). Mechanistic definition and prediction of the mass exchange coefficient between rivers and hyporheic zones: the  $\alpha$  of two  $\Omega$ s, *Journal of Hydrology*, accepted.
- 58:** Y. Song<sup>§</sup>, P. Chaemchuen, F. Rahmani, W. Zhi, L. Li, **X. Liu**, E. Boyer, T. Bindas, K. Lawson, and C. Shen (2024). Deep learning insights into suspended sediment concentrations across the conterminous United States: Strengths and limitations, *Journal of Hydrology*, 639, 131573.
- 57:** **X. Liu**, Y. Song<sup>§</sup>, and C. Shen (2024). Bathymetry Inversion using a Deep-Learning-Based Surrogate for Shallow Water Equations Solvers. *Water Resources Research*, 60, e2023WR035890.
- 56:** J. Farnana, A. Ecka, A. Kearney, F. L. Dorman, H. Ismail, E. Chase, **X. Liu**, N. R. Warner, W. D. Burgos (2024). Oil and Gas Produced Waters Fail to Meet Beneficial Reuse Recommendations for Use as Dust Suppressants. *Science of the Total Environment*, 919:170807.
- 55:** Y. Song<sup>§</sup>, C. Shen, and **X. Liu** (2023). Surrogate Model for Shallow Water Equations Solvers with Deep Learning. *Journal of Hydraulic Engineering*, 149(11): 04023045.
- 54.:** C. Shen, A. P. Appling, P. Gentine, T. Bandai, H. Gupta, A. Tartakovsky, M. Baity-Jesi, F. Fenicia, D. Kifer, L. Li, **X. Liu**, W. Ren, Y. Zheng, C. J. Harman, M. Clark, M. Farthing, D. Feng, P. Kumar, D. Aboelyazeed, F. Rahmani, Y. Song, H. E. Beck, T. Bindas, D. Dwivedi, K. Fang, M. Höge, C. Rackauckas, B. Mohanty, T. Roy, C. Xu, K. Lawson (2023). Differentiable modeling to unify machine learning and physics models for geoscience, *Nature Review Earth & Environment*, 4, 552-567.
- 53.:** D. Lu, T. Yang, **X. Liu** (2023). Editorial: Data-driven machine learning for advancing hydrological and hydraulic predictability. *Frontiers in Water*. 5:1215966.
- 52.:** Y. Xu<sup>§</sup> and **X. Liu** (2022). CFD-based evaluation and verification of FISP suspended sediment samplers. *Journal of Irrigation and Drainage Engineering*. 148(12): 04022043 (featured as Editor's Choice).
- 51.:** Y. Song<sup>§</sup>, A. Darzikolaei<sup>§</sup>, **X. Liu** (2022). Scour and burial of underwater unexploded ordnances (UXOs): An experimental and computational investigation. *Ocean Engineering*. 262(15): 112146.
- 50.:** Y. G. Lai, **X. Liu**, F. A. Bombardelli, Y. Song<sup>§</sup> (2022). Three-dimensional Numerical Modeling of Local Scour: A State-of-the-Art Review and Perspective. *Journal of Hydraulic Engineering*, 148(11):03122002.
- 49.:** A. Lee, A. F. Aubeneau, M. B. Cardenas, **X. Liu** (2022). Hyporheic exchange due to cobbles on sandy beds. *Water Resources Research*. 58, e2021WR030164.
- 48.:** Y. Song<sup>§</sup>, Y. Xu, H. Ismail\*, and **X. Liu** (2022). Scour modeling based on immersed boundary method: a pathway to practical use of three-dimensional scour models. *Coastal Engineering*. 171, 104037.
- 47.:** C. Zheng, J. Huang, **X. Liu**, and T. G. Cleveland (2022). Numerical simulation of drainage of permeable friction course (PFC) considering surface runoff and seepage flow. *Journal of Transportation Engineering, Part B: Pavements*. 148(1): 04021079.
- 46.:** S. M. Hajimirzaie, G. Constantinescu, **X. Liu**, T. Stoesser, and K. Zamani (2022). Computational Fluid Dynamics (CFD) Applications in Water-Resources Engineering, *Journal of Irrigation and Drainage Engineering*, 148(12): 02022001.

- 45.: Y. Yuan, X. Chen, M. B. Cardenas, **X. Liu**, and L. Chen (2021). Hyporheic exchange driven by submerged rigid vegetation: a numerical study. *Water Resources Research*. 57(6):e2019WR026675.
- 44.: Y. Zeng<sup>§</sup>, H. Ismail\*, and **X. Liu** (2021). A flow decomposition method for realistic rock weir hydraulics. *Journal of Irrigation and Drainage Engineering*, 147(8): 04021030.
- 43.: A. Lee, A. F. Aubeneau, **X. Liu**, and M. B. Cardenas (2021). Hyporheic exchange over dunes in rivers with deforming free water surface. *Water Resources Research*. 57, e2020WR028817.
- 42.: Y. Xu<sup>§</sup> and **X. Liu** (2021). An immersed boundary method with  $y^+$ -adaptation wall function for smooth wall shear. *International Journal of Numerical Methods in Fluids*. 93: 1929–1946.
- 41.: H. Ismail\*, M. Xiao, S. Salam, B. Scholl, and **X. Liu** (2021). Infill mobility through an engineered synthetic turf on steep slopes. *Journal of Hydraulic Engineering*. 147(8): 04021023.
- 40.: H. Ismail\*, Y. Xu<sup>§</sup>, and **X. Liu** (2021). Flow and scour around porous engineered log jam (ELJ) structures. *Journal of Hydraulic Engineering*. 147(1): 04020089.
- 39.: **X. Liu**, J. Zhang, K. Nelson, Y. A. Catano-Lopera (2020). Forum: Computational Fluid Dynamics for Water, Wastewater, and Stormwater Treatment. *Journal of Environmental Engineering*. 146(11): 02520002.
- 38.: Y. Song<sup>§</sup>, Y. Xu, and **X. Liu** (2020). A gradient-limited diffusive sand slide method in scour models. *Journal of Hydraulic Engineering*. 146(11): 04020074.
- 37.: Y. Song<sup>§</sup>, Y. Lai, and **X. Liu** (2020). An immersed boundary method for simulating flow hydrodynamics in streams with complex terrains. *Water*, 12(8):2226. Special Issue "Multi-Dimensional Modeling of Flow and Sediment Transport" organized by guest editor Dr. Yong Lai.
- 36.: T. Nagel, J. Chauchat, C. Bonamy, **X. Liu**, Z. Cheng, T. Hsu (2020). Three-dimensional scour simulations with a two-phase flow model, *Advances in Water Resources*, 138, 103544.
- 35.: B. Li<sup>§</sup>, **X. Liu**, M. H. Kaufman, A. Turetcaia, X. Chen, M. B. Cardenas (2020). Flexible and modular simultaneous modeling of flow and reactive transport in rivers and hyporheic zones. *Water Resources Research*, 56(2): e2019WR026528.
- 34.: Y. Wang, **X. Liu**, C. Yao, and Y. Li (2019). Debris flow impact forces on piers with different cross section shapes, *Journal of Hydraulic Engineering*, 146(10): 04019045.
- 33.: Y. Chen<sup>§</sup>, R. A. DiBiase, N. McCarroll, and **X. Liu** (2019). Rapid quantification of flow resistance in mountain streams. *Earth Surface Processes and Landforms*. 44(10): 1973-1987.
- 32.: H. Chen, **X. Liu**, and Q. Zou (2019). Wave attenuation and flow structures induced by submerged and suspended canopies, *Advances in Water Resources*. 123:160-172.
- 31.: Y. Chen<sup>§</sup>, **X. Liu**, J. Gulley, and K. Mankoff (2018). Direct observations and realistic modeling of a subglacial drainage conduit. *Geophysical Research Letters*. 45(20): 11206-11218.
- 30.: Y. Wang, **X. Liu**, C. Yao, Y. Li, S. Liu, and X. Zhang (2018). Finite-volume Release of Debris Flows around Round and Square Piers: An Experimental Study, *Journal of Hydraulic Engineering*. 144(12): 06018015.
- 29.: D. Liu, **X. Liu**, and X. Fu (2018). LES-DEM Simulations of Sediment Saltation in a Rough-wall Turbulent Boundary Layer, *Journal of Hydraulic Research*, 57(6): 786-797.
- 28.: M. Talebpour<sup>§</sup> and **X. Liu**. (2018). Numerical Investigation on the Suitability of a Fourth-Order Nonlinear  $k$ - $\omega$  Model for Secondary Current of Second Type in Open-Channels, *Journal of Hydraulic Research*, 57(1): 1-12.
- 27.: **X. Liu** (2018). Simulations of Suspended Sediment Transport using Low-Reynolds Number (LRN) Turbulence Models with a Unified Mesh, *Journal of Hydraulic Engineering*, 144(6): 04018029.
- 26.: Y. Jiang<sup>§</sup> and **X. Liu** (2018). Experimental and Numerical Investigation of Density Current over Macro-Roughness. *Environmental Fluid Mechanics*. 18(1): 97-116.
- 25.: Burgos, W. D., Castillo-Meza, L., Tasker, T. L., Geeza, T. J., Drohan, P. J., **X. Liu**, Landis, J. D., Blotvogel, J., McLaughlin, M., Borch, T., and Warner, N. R. (2017). Watershed-Scale Impacts from Surface Water Disposal of Oil and Gas Wastewater in Western Pennsylvania. *Environmental Science & Technology*, 51(15), 8851-8860.

- 24.: Y. Xu<sup>§</sup> and **X. Liu** (2017). Hydrodynamics Around Engineered Log Jam (ELJ): A Comparison with Different Computational Modeling Approaches. *Water*, Special Issue "Stream Channel Stability, Assessment, Modeling, and Mitigation", guest editor: Peggy Johnson, 9(2), 110.
- 23.: Zhou, Z., Hsu, T., Cox, D. and **X. Liu** (2017). Large-Eddy Simulation of Wave-Breaking Induced Turbulent Coherent Structures and Suspended Sediment Transport on a Barred Beach. *Journal of Geophysical Research-Oceans*, 122(1), 207-235.
- 22.: Mankoff, K., Gulley, J., Slawek, T., Covington, M., **X. Liu**, Chen, Y.<sup>§</sup>, Benn, D., and Glowacki, P. (2017). Roughness of a Subglacial Conduit under Hansbreen, Svalbard. *Journal of Glaciology*, 63(239), 423-435.
- 21.: Waterman, D. M., **X. Liu**, Motta, D., and Garcia, M. H. (2016). Analytical Lagrangian Model of Sediment Oxygen Demand and Reaeration Flux Coevolution in Streams. *Journal of Environmental Engineering*, 142(7), 04016028.
- 20.: Shen, C., Wang, S., and **X. Liu** (2016). Geomorphological Significance of the At-Many-Stations Hydraulic Geometry. *Geophysical Research Letters*, 43(8), 3762–3770.
- 19.: Liu, D., **X. Liu**, Fu, X., and Wang, G. (2016). Quantification of the Bedload Effects on Turbulent Open Channel Flows. *Journal of Geophysical Research-Earth Surface*, 121(4), 767–789.
- 18.: **X. Liu**, Chen, Y.<sup>§</sup>, and Shen, C. (2016). Coupled Two-dimensional Surface Flow and Three-dimensional Sub-surface Flow Modeling for the Drainage of Permeable Road Pavement. *Journal of Hydrological Engineering*. 21(12): 04016051.
- 17.: **X. Liu** (2016). Analytical Solutions for Steady Two-Dimensional Suspended Sediment Transport in Channels with Arbitrary Advection Velocity and Eddy Diffusivity Distributions. *Journal of Hydraulic Research*, 54(4), 1-10.
- 16.: **X. Liu**, and M. Nayamatullah<sup>§</sup> (2014). Semianalytical solutions for one-dimensional unsteady nonequilibrium suspended sediment transport in channels with arbitrary eddy viscosity distributions and realistic boundary conditions, *Journal of Hydraulic Engineering*, 140(5), 04014011.
- 15.: **X. Liu** (2014). New Near-Wall Treatment for Suspended Sediment Transport Simulations with High-Reynolds Number (HRN) Turbulence Models. *Journal of Hydraulic Engineering*, 140(3):333-339.
- 14.: **X. Liu** and Jiang, Y.<sup>§</sup>. (2014). Direct Numerical Simulations of Boundary Condition Effects on the Propagation of Density Current in Wall-Bounded and Open Channels. *Environmental Fluid Mechanics*, 14(2), 387–407.
- 13.: S. Sinha, **X. Liu**, and M.H. Garcia (2013). A Three-dimensional Water Quality Model of Chicago Area Waterway System (CAWS), *Environmental Modeling & Assessment*, 18:567-592.
- 12.: **X. Liu** (2013), Parallel Modeling of Three-Dimensional Variably Saturated Porous Media Flows using Finite Volume Method on Unstructured Meshes using Open Source Finite Volume Platform OpenFOAM. *Engineering Applications of Computational Fluid Dynamics*, 7(2): 223-238.
- 11.: A.W. Nielsen, **X. Liu**, B.M. Sumer, and J. FredsØe (2013). Flow and Bed Shear Stresses in Scour Protections around a Pile in a Current, *Coastal Engineering*, 72:20-38.
- 10.: S. Sinha, **X. Liu**, and M.H. García (2012). Three-dimensional Hydrodynamic Modeling of the Chicago River, Illinois, *Environmental Fluid Mechanics*, 12(5):471-494.
- 9.: **X. Liu**, G. Parker, J. Czuba, K. Oberg, J.M. Mier, J.L. Best, D.R. Parsons, P. Ashmore, and M.H. García (2011). Sediment Mobility and Bed Armoring in the St. Clair River: Insights from Hydrodynamic Modeling. *Earth Surface Processes and Landforms*, 37(9):957-970.
- 8.: **X. Liu** (2011). Extension of Kleiser and Schumann's Influence-Matrix Method for Generalized Velocity Boundary, *Journal of Computational Physics*, 230(22):7911-7916.
- 7.: **X. Liu** and M.H. García (2011). Computational Fluid Dynamics (CFD) Modeling for the Design of Large Primary Settling Tanks. *Journal of Hydraulic Engineering*, 137(3):343-355.
- 6.: A.S. León, **X. Liu**, M.S. Ghidaoui, A.R. Schmidt and M.H. García (2010), Junction and Drop-Shaft Boundary Conditions for Modeling Free-Surface, Pressurized, and Mixed Free-Surface Pressurized Transient Flows, *Journal of Hydraulic Engineering*, 136(10):705-715.
- 5.: **X. Liu** and M.H. García (2008). Coupled Two-Dimensional Model for Scour Based on Shallow Water Equations with Unstructured Mesh. *Coastal Engineering*. 55(10): 800-810.



- 4.: **X. Liu** and M.H. García (2007). A 3D Numerical Model with Free Water Surface and Mesh Deformation for Local Sediment Scour. *Journal of Waterway, Port, Coastal, and Ocean Engineering*. 134(4): 203-217.
- 3.: **X. Liu** and M.H. García (2007). Discussion of “Divergence Form for Bed Slope Source Term in Shallow Water Equations” by A. Valiani and L. Begnudelli. *Journal of Hydraulic Engineering*. 134(5): 678-679.
- 2.: **X. Liu** and M.H. García (2007). Numerical Investigation of Sea Bed Response under Waves with Free-surface Water Flow. *International Journal of Offshore and Polar Engineering*, 17(2), 97-104.
- 1.: **X. Liu**, J. Ni, and T. Li (2004). A Quadtree Based Method for Dynamic Partitioning Integrated Information Units with Different Scales and its Implementation. *Journal of Basic Science and Engineering*, 12(1): 24-32 (in Chinese).

## Papers under Review

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- S. A. M. Darzikolaiea, J. C. Curran, and X. Liu. Experimental Study on Flow and Sediment Patterns around Porous Engineered Log Jams, *Journal of Hydraulic Engineering*
- W. Zhi, H. Baniecki, J. Liu, E. Boyer, C. Shen, G. Shen, X. Liu, L. Li. Increasing Phosphorus Loss Despite Widespread Concentration Decline in US Rivers, *Proceedings of National Academy of Science*
- B. Li, M. B. Cardenas, X. Chen, and X. Liu. Flow and transport in heterogeneous hyporheic zones with cross-bedded sediments. *Water Resources Research*

## Non-Peer-Reviewed Publications

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- J. Zhang, X. Liu, A. Tejada-Martinez, and Q. Zhang. (2016). Computational Fluid Dynamics: A promising tool for analysis and design of water and wastewater treatment, *Hydrolink Magazine*, IAHR, Year 2016, Number 2, pages 39-41

## Books

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- 2021:** J. Rice, X. Liu, I. Sasanakul, M. Mclroy, M. Xiao (editors; 2021). *Proceedings of the 10th International Conference on Scour and Erosion (ICSE-10)*. International Society of Soil Mechanics and Geotechnical Engineering, Geo-Institute of American Society of Civil Engineering.
- 2019:** X. Liu and J. Zhang (editors; 2019). *Computational Fluid Dynamics Applications in Water, Wastewater, and Stormwater Treatment*. American Society of Civil Engineering.

## Book Chapters

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- 2021:** M. J. Franca, D. Valero, and X. Liu (2021). Turbulence and rivers. In *Treatise in Geomorphology*, 2nd edition, editor Ellen Wohl. Elsevier.
- 2019:** X. Liu. Introduction. in *Computational Fluid Dynamics Applications in Water, Wastewater, and Stormwater Treatment*. ASCE.
- 2019:** X. Liu. Chapter 1. Physical Processes. in *Computational Fluid Dynamics Applications in Water, Wastewater, and Stormwater Treatment*. ASCE.
- 2019:** X. Liu. Chapter 4. Overview of Computational Fluid Dynamics. in *Computational Fluid Dynamics Applications in Water, Wastewater, and Stormwater Treatment*. ASCE.
- 2019:** X. Liu. Chapter 11. Sedimentation. in *Computational Fluid Dynamics Applications in Water, Wastewater, and Stormwater Treatment*. ASCE.
- 2014:** X. Liu. Open channel hydraulics: From them to now and beyond, in *Modern Water Resources Engineering*, Humana Press.

## Selected Reports

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- 2024:** X. Liu, A. Mazdeh\*, L. W. Zevenbergen, C. M. Kramer . NCHRP Research Report 1077: Selection and Application of Manning’s Roughness Values in Two-Dimensional Hydraulic Models.
- 2021:** X. Liu, Y. Xu<sup>§</sup> and Y. Song<sup>§</sup>. Robust Ecohydraulic 3D Modeling Tools for Rivers with Complex

## Selected Conference Papers

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- 37.: **X. Liu** and Y. Xu. An immersed boundary wall function for smooth wall shear stress, *The 13th OpenFOAM Workshop, Shanghai, China*, 2018.
- 36.: **X. Liu** and Y. Xu. Scour modeling around hydraulic structures with complex geometries, *International Conference on Sedimentation and Erosion, Taiwan*, 2018.
- 35.: T. Nagel, J. Chauchat, Z. Cheng, C. Bonamy, **X. Liu**, T. Hsu, and O. Bertrand. Two-phase Flow Simulations of Scour around a Cylindrical Pile, *Coastal Dynamics*, 2017.
- 34.: B. Jensen, **X. Liu**, and E. D. Christensen. Porous Media and Immersed Boundary Hybrid-Modelling for Simulating Flow in Stone Cover-Layers, *Coastal Dynamics*, 2017.
- 33.: R. A. DiBiase, **X. Liu**, Y. Chen, A. B. Neely, and N. R. McCarroll. Rapid characterization of streambed microtopography in mountain channels: Methods and application using structure from motion photogrammetry, *GSA Meeting*, 2017.
- 32.: K. Chen, Y. Chen, Y. You, **X. Liu**, T. Hu, and W. Li. Computational Modeling of the Evolution of Submerged Laminar Round Jet in Shallow Water, *International Ocean and Polar Engineering Conference, Hawaii, USA*, 2015.
- 31.: M. Nayamatullah and **X. Liu**. Analytical Solutions for Unsteady Two-Dimensional Suspended Sediment Transport in Open Channel with Variable Eddy Viscosity Distributions, *ASCE EWRI*, 2014.
- 30.: **X. Liu**. An Innovative Computational Approach for the Hydrodynamics around Large Woody Debris with Arbitrary Geometrical Shapes, *ASCE EWRI*, 2014.
- 29.: Z. Zhou, T. Hsu, F. C. K. Ting, and **X. Liu**. The effects of wave-breaking-induced turbulence on bottom stress and suspended sediment transport - A 3D numerical study, *The 34th International Conference on Coastal Engineering, Seoul, Korea*, 2014.
- 28.: **X. Liu**. Realistic Flow Simulations around and inside Porous Scour Protections, *IAHR, Chengdu, China*, 2013.
- 27.: **X. Liu**, D. Liu, H. Ma, M. Nayamatullah, and X. Fu. Near-Wall Treatment for Suspended Sediment in Boundary-Layer Resolving Numerical Models, *IAHR, Chengdu, China*, 2013.
- 26.: **X. Liu** and M. Nayamatullah. Analytical solutions for the suspended sediment transport in channels using Generalized Integral Transform Technique (GITT), *ASCE EWRI*, 2013.
- 25.: R. Ashraf and **X. Liu**. Channel instability predictions and their impact on transportation infrastructures: Case study for five rivers in Texas, *ASCE EWRI*, 2013.
- 24.: **X. Liu**, Y. Jiang, and R. Sinir. Simulation of flow field around and inside porous scour protection with physical and realistic particle configurations from computer graphics, *Computational Methods in Water Resources XIX International Conference, Champaign, IL*, 2012.
- 23.: Y. Jiang, **X. Liu**, and R. Sinir. Computational Modeling of Density Current over Rough and Uneven Bottoms, *Computational Methods in Water Resources XIX International Conference, Champaign, IL*, 2012.
- 22.: R. Sinir, **X. Liu**, and Y. Jiang. Computer generated particle arrangement for pore scale modeling, *Computational Methods in Water Resources XIX International Conference, Champaign, IL*, 2012.
- 21.: Y. Jiang and **X. Liu**. Numerical and experimental investigation of density current over bedforms and rough bottom, *The Third International Symposium on Shallow Flows, Iowa City, Iowa, USA*, 2012.
- 20.: **X. Liu**, S. Sinha, D. Motta, and M.H. Garcia. Density current caused by CSO events in Bubbly Creek, Chicago, Illinois, *The Third International Symposium on Shallow Flows, Iowa City, Iowa, USA*, 2012.
- 19.: **X. Liu**. Direct numerical simulation of boundary condition effects on the propagation of density current in a channel, *RCEM2011: River, Coastal and Estuarine Morphodynamics, Beijing, China*, 2011.
- 18.: S. Sinha, **X. Liu**, and M. H. García. Three dimensional hydrodynamic and water quality modeling of a CSO (combined sewer overflow) event in Bubbly Creek, Chicago, IL, *Riverflow*, 2010, Braunschweig, Germany. (peer-reviewed)
- 17.: S. Dutta, Y. Catano, **X. Liu**, and M. H. García. Computational Fluid Dynamics (CFD) Modeling of Flow into the Aerated Grit Chamber of the MWRD's North Side Water Reclamation Plant, Illinois, *ASCE*
- Last updated: September 6, 2024

*EWRI World Environmental & Water Resource Congress, Providence, Rhode Island, USA, 2010.*

**16.:** **X. Liu**, G. Parker, and M.H. García. Numerical Modeling of the St. Clair River and Sediment Mobility Analysis, *ASCE EWRI World Environmental & Water Resource Congress, Providence, Rhode Island, USA, 2010.*

**15.:** P. Ashmore, J. Best, J. Czuba, J. Denny, D. Foster, K. Oberg, M. H. Garcia, **X. Liu**, G. Parker, D. Parsons. Morphology, sedimentology and dynamics of the upper St. Clair River, *53rd International Conference on Great Lakes Research, Toronto, Canada, 2010.*

**14.:** M. Qi, **X. Liu**, M.H. García, and P. Jiang. Channel Degradation in the Yangtze River due to Decreased Sediment Supply, *33rd IAHR Congress, Vancouver, Canada, 2009.*

**13.:** **X. Liu**, S. Sinha, N.A. Sobh, and M.H. García. Three-Dimensional Water Quality Modeling of the Chicago River, IL, *UCOWR/NIWR Annual Conference, Chicago, USA, 2009.*

**12.:** **X. Liu**, S. Sinha, D. Motta, and M.H. García. Upstream Intrusion Effect of CSO Event in Bubbly Creek, IL, *ASCE EWRI World Environmental & Water Resource Congress, Kansas City, Missouri, USA, 2009.*

**11.:** A.S. León, **X. Liu**, M.S. Ghidaoui, A.R. Schmidt, and M.H. García. Boundary Conditions for Simulating Complex Storm-sewer Systems in Free Surface, Pressurized, and Mixed Flow Conditions, *ASCE EWRI World Environmental & Water Resource Congress, Kansas City, Missouri, USA, 2009.*

**10.:** D. Motta, J.D. Abad, **X. Liu**, and M.H. García. Two-dimensional BOD and DO Water Quality Model for Engineering Applications: the Case of Bubbly Creek in Chicago, Illinois, *ASCE EWRI World Environmental & Water Resource Congress, Kansas City, Missouri, USA, 2009.*

**9.:** A.S. León, Y.A. Cataño-Lopera, **X. Liu**, A.R. Schmidt, and M.H. García. Experimental and CFD Modeling of a Vortex Flow Restrictor, *World Environmental & Water Resource Congress, Honolulu, Hawaii, 2008.*

**8.:** **X. Liu** and M.H. García. Optimal Design of the Chicago Calumet Water Reclamation Plant (CCWRP) Primary Settling Tanks with 3D Numerical Models, *World Environmental & Water Resource Congress, Honolulu, Hawaii, 2008.*

**7.:** **X. Liu** and M.H. García. Numerical Simulations of Density Current in Chicago River Using Environmental Fluid Dynamics Code (EFDC), *World Environmental & Water Resource Congress, Honolulu, Hawaii, 2008.*

**6.:** C. Brunner, E. Brosius, E. Podczewinski, M.H. García, and **X. Liu**. Computational Fluid Dynamics (CFD) Modeling and Optimal Design of Primary Settling Tanks at Calumet, Chicago, *Water Environment Federation's Annual Technical Exhibition and Conference, Chicago, IL, 2008.*

**5.:** C. Brunner, E. Brosius, E. Podczewinski, M.H. García, and **X. Liu**. Optimizing the Design of Primary Settling Tanks Using CFD Modeling, *IWEA 29th Annual Conference and Exhibition, Peoria, IL, 2008.*

**4.:** **X. Liu** and M.H. García. Coupled Model of Shallow Water Equations and Sediment Transport on Unstructured Mesh, *Fifth International Symposium on Environmental Hydraulics, Tempe, Arizona, 2007.*

**3.:** **X. Liu** and M.H. García. Numerical Simulation of Rectangular Settling Tank with Scraper Using Dynamic Mesh, *Fifth International Symposium on Environmental Hydraulics, Tempe, Arizona, 2007.*

**2.:** **X. Liu** and M.H. García. Numerical Simulation of sea bed response under waves with coupled solver of Biot consolidation equations and free surface water flow, *ISOPE PACOMS, Dalian, China, 2006 (peer-reviewed).*

**1.:** **X. Liu** and M.H. García. Numerical Simulation of Local Scour with Free Surface and Automatic Mesh Deformation, *World Environmental & Water Resource Congress, Omaha, NE, 2006.*

## Technology Transferred or Adopted in the Field

**2016:** **Liu, X.** "An improved version of a computational model for non-physical fish barrier," **U.S. Army Corps of Engineers. Completed. (2016).** We upgraded and improved a US Army Corps of Engineers model for non-physical fish barrier, including bubble curtain, low-frequency sound, and LED modulated intensity lights. Specifically, we rectified some model bugs and ported the code into the latest version of the open-source CFD package OpenFOAM.

**2016: Liu, X. "Automatic mesh generation for complex geometries," U.S. Bureau of Reclamation. Completed. (2016).** We modified the open-source CFD package OpenFOAM's mesh generation tool named snappyHexMesh for easy use in river engineering. The tool was then ported into Windows environment for USBR engineers. A MS Excel spreadsheet with embedded VBA code for pre-processing the mesh input file was also delivered.

## Invited Talks

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**2024:** University of Missouri, Columbia. "Physics-Based and Data-Driven Modeling in Environmental Hydraulics".

**2023:** China Agriculture University. "Physics-Based and Data-Driven Modeling in Environmental Hydraulics".

**2023:** University of Buffalo. "Physics-Based and Data-Driven Modeling in Environmental Hydraulics".

**2022:** FHWA Hydraulics Lab, "3D Scour Modeling for Engineering Practice – Current Status and Future R&D Needs".

**2022:** USACE ERDC, Vicksburg, MS, "Physics-Based and Data-Driven Modeling in Environmental Hydraulics".

**2022:** ETH Zurich, "Ecohydraulics Modeling for River Restoration".

**2022:** Karlsruhe Institute of Technology. "Physics-Based and Data-Driven Modeling in Environmental Hydraulics".

**2022:** Clarkson University, "Hydraulics and performance evaluations of fish passages based on CFD and individual-based methods".

**2020:** American Geophysical Union Fall Meeting, in Session "Interactions of flow, sediment, and wood in river ecosystems: observations and modeling" convened by Isabella Schalko, Elizabeth Follett, Heidi Margaret Nepf, and Ellen Wohl.

**2020:** Red Yaku, Peru, "Building computer models like Legos: Dynamics and prediction of coupled fluid-object-sediment systems".

**11.:** American Geophysical Union Fall Meeting, in Session "Novel Multiscale and Multi-Process Modeling Constructs to Understand and Predict Watershed System Function" convened by Timothy D. Scheibe and Yunxiang Chen.

**2020:** Saint Francis University, "Computational Modeling: A Tool for Water and Environmental Research".

**2019:** Virginia Tech, "Dynamics and prediction of coupled fluid-object-sediment systems".

**2019:** Penn State Environmental Engineering Seminar, "Computational modeling: a tool for water and environmental research".

**2018:** The 8th International Symposium on Environmental Hydraulics, "Coupled LES-DEM Simulations of Particle Saltation".

**2017:** Hohai University, China, Computational Hydraulics with OpenFOAM.

**2016:** University of Texas at San Antonio, Model Development and Applications for the Drainage of Permeable Road Pavement.

**2016:** Wuhan University, China, Computational Hydraulics with OpenFOAM.

**2015:** U.S. Army Corp of Engineers, Vicksburg, MS. Computational Modeling of Surface and Internal Erosion.

**2015:** California Department of Transportation, Roadway Hydraulics Simulations with OpenFOAM.

**2014:** Cornell University, USA, Computational modeling of free surface flows around arbitrary objects: Applications for environmental hydraulics.

**2014:** Penn State University, USA, Immersed boundary method for free surface flows around arbitrary objects using OpenFOAM: Applications for environmental hydraulics, Fluid Dynamics Research Consortium.

**2013:** University of Delaware, USA, Flow Penetration into Porous Hydraulic Structures: A New Computational Approach for an Old Multi-scale Problem.

**24.:** LSU, USA, Flow Penetration into Porous Hydraulic Structures: A New Computational Approach for

an Old Multi-scale Problem.

**2013:** TAMU, USA, Density Current over Rough and Uneven Bottoms, Department of Civil and Environmental Engineering.

**2012:** Technical University of Denmark (DTU) and Danish Hydraulic Institute (DHI), Denmark, Simulation of Flow Field Around and Inside Scour Protection with Physical and Realistic Particle Configurations.

**2012:** National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences, Beijing, China, Generalized Kleiser and Schumann's Influence-Matrix Method for Direct Numerical Simulations of Turbulent Flows.

**2012:** University of Houston, USA, How can Angry Birds© save the world? Current research in the environmental fluid dynamics group at UTSA, Department of Civil and Environmental Engineering.

**2011:** TAMU, USA, DNS Simulations of Density Current using Generalized Kleiser and Schumann's Influence-Matrix Method, Department of Civil and Environmental Engineering.

**2010:** Department of Mechanical Engineering, UTSA, USA, Generalized Kleiser and Schumann's Influence-Matrix Method for Direct Numerical Simulations of Turbulent Flows.

**2010:** Department of Civil and Environmental Engineering, UTSA, USA, Generalized Velocity Boundary Conditions and "tau" Error Corrections for Kleiser and Schumann's Influence-Matrix Method.

**2010:** UT Austin, USA, Modeling of Sediment Transport and Porous Medium Response under Currents and Waves.

**2009:** Argonne National Lab, Chicago, USA, Numerical Models for Scour around Object under Currents and Waves.

**2009:** University of Texas at San Antonio, USA, Local Scour and Liquefaction around Objects under Currents and Waves.

**2009:** Pacific Northwest National Lab, USA, Environmental Multiphase Flow Modeling.

**2009:** Queen's University at Belfast, UK, Computational Modeling of Environmental Hydraulics.

**2009:** Tsinghua University, China, Modeling of Sediment Transport and Porous Medium Response Under Current and Waves.

**2006:** University of Illinois at Urbana-Champaign, USA, Multiphase flow in environmental hydraulics: sediment transport, settling tanks, water quality and more.

**2006:** University of Illinois at Urbana-Champaign, USA, Local Scour and Liquefaction around Objects under Waves.

## Professional Society Membership

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- Member of American Geological Union (AGU)
- Member of American Society of Civil Engineering (ASCE)
- Member of International Association for Hydraulic Engineering and Research (IAHR)

## External Service to Society and Profession

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### Committee leadership positions and membership.....

**2024 - present:** Secretary for ASCE EWRI Hydraulics and Waterways Council

**2024-present:** Chair for ASCE EWRI Technical Committee "Sedimentation"

**2024-present:** Co-Chair for ASCE EWRI Technical Committee "ML/AI Applications in Water Engineering"

**2022-2024:** Vice-Chair for ASCE EWRI Technical Committee "Sedimentation"

**2017-2020:** Chair for ASCE EWRI Technical Committee "CFD Applications in Water, Wastewater and Stormwater Treatment"

**2015-2017:** Vice-Chair for ASCE EWRI Technical Committee "CFD Applications in Water, Wastewater and Stormwater Treatment"

### Organizing conferences and sessions.....

**2020 - present:** ASCE EWRI Congress Track Chair for the Hydraulics and Waterways Council

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Xiaofeng Liu

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**2023-present:** Co-Convener for Session “Breaking Barriers in Sediment Transport Research Across Science and Engineering”, AGU Fall Meeting

**2021:** Co-convener for the Ecohydraulics Online Forum for IAHR Open Forum 2021

**2020:** Local organizing committee member, the 15th OpenFOAM Workshop, Arlington, VA

**2020:** Technical co-chair, the 10th International Conference on Scour and Erosion (ICSE-10), Arlington, VA

**2016-2018:** Co-Convener for Session “Modeling earth surface processes using computational fluid dynamics across scales”, AGU Fall Meeting

**2017:** Science Steering Committee Member for Cyberinformatics and Numerics Working Group of the Community Surface Dynamics Modeling System (CSDMS) funded by NSF

**2010- 2016:** Co-Chair for Section “Sediment Transport Modeling”, ASCE EWRI Congress

**2016:** Chair for session, River Flow Conference, St. Louis, MO.

**2015:** International Scientific Committee Member, The 9th Symposium on River, Coastal and Estuarine Morphodynamics (RCEM)

**2015:** Participant in the first Oregon State Natural Hazards Engineering Research Infrastructure Workshop. Participated in the discussion of the NSF workshop and contributed to the research directions.

**2013-2016:** Chair for Session “Computational Hydraulics for Sustainability”, ASCE EWRI Congress

**2012:** Co-Chair for Session “High-Dimensional Modeling of River and Streams”, XIX International Conference on Computational Methods in Water Resources (CMWR)

**2010:** Chair for Session “CFD Application in Environmental Hydraulics”, ASCE EWRI Congress

**2007:** Chair for Session II “Computational Environmental Fluid Mechanics”, International Symposium on Environmental Hydraulics

#### **Workshop and training courses offered**

**2023:** Instructor for the workshop “Python Programming for Hydraulics Modeling” at ASCE EWRI Congress

**2016:** Taught a one-day short course on Pre- and Post-processing for SRH-2D using Open Source Software at Taiwan Water Resources Agency.

**2015:** Co-taught a one-day short course on SRH-2D modeling at ASCE EWRI Congress with Dr. Yong Lai (developer of SRH-2D model at Bureau of Reclamation).

**2013:** Instructor for a technical clinic titled “Modeling of Earth Surface Dynamics and Related Problems using OpenFOAM” at the NSF-funded Community Surface Dynamics Modeling System (CSDMS) annual meeting, Boulder, Colorado.

**2012:** Taught a one-day short course: “Development and application using open source computational fluid dynamics (CFD) package OpenFOAM for water resources and environmental problems”, at ASCE EWRI World Water Congress.

**2012:** Organized a two-day workshop on hydraulics and sediment transport modeling with the San Antonio River Authority (SARA)

#### **Volunteer service to professional societies**

**2016:** Volunteer judge for the Outstanding Student Presentation Award, AGU, 2016. Judged 5 student posters at AGU 2016 Fall Meeting.

**2015:** Volunteer judge for the Outstanding Student Presentation Award, AGU, 2015. Judged 10 student posters at AGU 2015 Fall Meeting.

**2015:** Coordinator of the Outstanding Student Presentation Award, AGU, 2015. As a coordinator, my responsibilities include communicating with the president, session chairs, voluntary judges, and students; assignment judge slots; selection of award winners.

#### **Mentoring activities**

**2023-2024:** Mentored two junior researchers through the NSF-funded MIST (Mentoring Institute for Sediment Transport Researchers)

**2023-2024:** Executive Committee Member of the NSF-funded MIST (Mentoring Institute for Sediment

Transport Researchers)

### External P&T case evaluation.....

**2022-present:** Evaluator for P&T cases

### Professional services to society.....

**2023-2024:** Special Master (Referee for flood modeling) for the class action lawsuit *City of Miami et al. v. Grand River Dam Authority*

**2011-2012:** Expert panelist for International Boundary and Water Commission

**2011:** Expert panelist for the National Association of State and Utility Consumer Advocates (NASUCA)

## Internal Service to University

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### Department.....

**2014-2024, several times:** Penn State CEE Water area coordinator

**2024-2025:** Leader for the working group for AI/ML for CEE

**2021-2022:** Search committee member for Penn State CEE Geotechnical faculty position

**2021-2022:** Member of Penn State CEE Undergraduate Committee

**2020-2021:** Search committee chair for Penn State CEE Smart Water faculty position

**2020-2021:** Search committee member for Penn State CEE Transportation faculty position

**2020-2022:** Member of Penn State CEE Departmental Seminar Committee

**2020-2022:** Member of Penn State CEE Departmental P&T Committee

**2019-2020:** Member of Penn State CEE Workload Committee

**2018-2019:** Search committee member for Penn State CEE Structural/Transportation faculty position

**2016-2017:** Leader for the working group for CEE undergraduate numerical method course

**2015-2017, 2023-2024:** Member of Penn State CEE Graduate Committee

**2016-2017:** Search committee member for Penn State CEE Geotechnical faculty position

**2015-2016:** Search committee member for Penn State CEE Water Ethics faculty position

**2015-2016:** Search committee member for Penn State CEE Stormwater faculty position

**2014-2024, several times:** Member of Penn State CEE Safety Committee

**2014-2015:** Member of Penn State CEE Department Head Search Committee

### College.....

**2023-2026:** Alternative member for College of Engineering Graduate Council

**2016-2017:** Member of College of Engineering Research Computing Committee

**2015-2018, every year:** Judge for the Annual College of Engineering Research Symposium

### University.....

**2024-2025:** Member of AI Strategic Vision for PSU Committee

**2020-2021:** Co-chair for Penn State Data Science Community

**2017:** Member of Subcommittee for Institute of CyberScience Affiliates and Associates Program, Institute of CyberScience

**2018:** Judge for for the 2018 Penn State Institute of Cyberscience Symposium

**2015:** Organizer of Penn State Fluid Dynamics Research Consortium Seminar Series