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RESEARCH INTERESTS

Computational Fluid Dynamics, Physiological modeling, Turbulence Modeling, Machine Learning, Data Assimilation/Optimization, Uncertainty Quantification

EDUCATION

- Ph.D., Aerospace Engineering** 05/2017
Virginia Tech, USA
- Dissertation: Physics-Informed, Data-Driven Framework for Model-Form Uncertainty Estimation and Reduction in RANS Simulations
- M.S., Ocean Engineering** 12/2016
Virginia Tech, USA
- M.S., Mechanical Engineering** 07/2013
Harbin Institute of Technology, P.R. China
- Outstanding Graduate Student of Heilongjiang Province
- B.S., Naval Architecture and Ocean Engineering** 06/2011
Harbin Institute of Technology, P.R. China
- Outstanding Graduate Student of Harbin Institute of Technology

ACADEMIC EXPERIENCE

- Assistant Professor** 08/2018 to present
Aerospace and Mechanical Engineering, University of Notre Dame, USA
- Postdoctoral Scholar** 08/2017 to 08/2018
Mechanical Engineering, University of California, Berkeley, USA
- Research Affiliate** 08/2017 to 08/2018
Aerospace and Mechanical Engineering, University of Notre Dame, USA
- Visiting Scholar** 06/2016 to 07/2016
Center For Turbulence Research, Stanford University, USA
- Research Assistant** 08/2013 to 05/2017
Dept. of Aerospace and Ocean Engineering, Virginia Tech, USA

TEACHING

University of Notre Dame

2018 - Present

- *AME50532: Computational Fluid Dynamics, Fall 2018, (Instructor)*

Virginia Tech

2013 - 2016

- *AOE4154: Aerospace Engineering Laboratory, Fall 2016, (Teaching Assistant)*
- *AOE4334: Ship Dynamics, Fall 2016, (Teaching Assistant)*
- *AOE4214: Ocean Wave Mechanics, Spring 2015, (Teaching Assistant)*
- *AOE2204: Introduction to Ocean Engineering, Fall 2014, (Teaching Assistant)*
- *AOE4244: Marine Engineering, Spring 2014, (Teaching Assistant)*
- *AOE2204: Introduction to Ocean Engineering, Fall 2013, (Teaching Assistant)*

RESEARCH ADVISING

Ph.D. Students

- *Han Gao, AME, Notre Dame, 08/2018 - present*
- *Luning Sun, AME, Notre Dame, 08/2018 - present*

Master Students

- *Aldo Gargiulo, ME (Visiting Master), ETH Zurich, 03/2016 - 11/2016*

Thesis & Qualifying Exam Committee

- *Sina Malakpour, AME, Notre Dame, 08/2018*
- *Govinda Anantha Padmanabha, AME, Notre Dame, 08/2018*
- *Nick Geneva, AME, Notre Dame, 08/2018*

PUBLICATIONS ([\[Google Library\]](#) & [\[ResearchGate\]](#))

Peer-Reviewed Journal Articles (Published or Accepted)

1. **J.-X. Wang**, X. Hu, S. Shadden. Data-augmented modeling of intracranial pressure. *Annals of Biomedical Engineering*, 2018 (Accepted).
2. **J.-X. Wang**, J.-J. Huang, L. Duan, H. Xiao. Prediction of Reynolds stresses in high-Mach-number turbulent boundary layers with physics-informed machine learning. *Theoretical and Computational Fluid Dynamics*, 2018 (Accepted).
3. **J.-X. Wang**, T. Hui, H. Xiao, and R. Weiss. Inferring tsunami flow depth and flow speed from sediment deposits based on Ensemble Kalman Filtering. *Geophysical Journal International*, 212(1), 646-658, 2018, [DOI:10.1093/gji/ggx435](https://doi.org/10.1093/gji/ggx435)

4. **J.-X. Wang**, C. J. Roy and H. Xiao. Propagation of input uncertainty in presence of model-form uncertainty: a multi-fidelity approach for CFD applications. *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, 4(1), 011002, 2018. DOI: [10.1115/1.4037452](https://doi.org/10.1115/1.4037452)
5. **J.-X. Wang**, J.-L. Wu, and H. Xiao. A Physics Informed Machine Learning Approach for Reconstructing Reynolds Stress Modeling Discrepancies Based on DNS Data. *Physical Review Fluids*, 2(3), 034603, 1-22, 2017. DOI: [10.1103/PhysRevFluids.2.034603](https://doi.org/10.1103/PhysRevFluids.2.034603)
6. H. Xiao, **J.-X. Wang** and Roger G. Ghanem. A random matrix approach for quantifying model-form uncertainties in turbulence modeling. *Computer Methods in Applied Mechanics and Engineering*, 313, 941-965, 2017. DOI: [10.1016/j.cma.2016.10.025](https://doi.org/10.1016/j.cma.2016.10.025)
7. J.-L. Wu, **J.-X. Wang**, H. Xiao, J. Ling. A Priori Assessment of Prediction Confidence for Data-Driven Turbulence Modeling, *Flow, Turbulence and Combustion*, 99 (1), 1-22, 2017. DOI: [10.1007/s10494-017-9807-0](https://doi.org/10.1007/s10494-017-9807-0)
8. **J.-X. Wang**, H. Xiao. Data-driven CFD modeling of turbulent flows through complex structures. *International Journal of Heat and Fluid Flow*, 62 (B): 138-149, 2016. DOI: [10.1016/j.ijheatfluidflow.2016.11.007](https://doi.org/10.1016/j.ijheatfluidflow.2016.11.007)
9. **J.-X. Wang**, R. Sun, H. Xiao. Quantification of uncertainty in RANS models: A comparison of physics-based and random matrix theoretic approaches. *International Journal of Heat and Fluid Flow*, 62 (B): 577-592, 2016. DOI: [10.1016/j.ijheatfluidflow.2016.07.005](https://doi.org/10.1016/j.ijheatfluidflow.2016.07.005)
10. **J.-X. Wang**, J.-L. Wu, and H. Xiao. Incorporating prior knowledge for quantifying and reducing model-form uncertainty in RANS simulations. *International Journal of Uncertainty Quantification*, 6 (2): 109-126, 2016. DOI: [10.1016/j.ijunc.2016.01.007](https://doi.org/10.1016/j.ijunc.2016.01.007)
11. H. Xiao, J.-L. Wu, **J.-X. Wang**, R. Sun, and C. J. Roy. Quantifying and reducing model-form uncertainties in Reynolds averaged Navier-Stokes equations: a data-driven, physics-informed, Bayesian approach. *Journal of Computational Physics*, 324, 115-136, 2016. DOI: [10.1016/j.jcp.2016.07.038](https://doi.org/10.1016/j.jcp.2016.07.038)
12. H. Tang, **J.-X. Wang**, R. Weiss and H. Xiao. TSUFLIND-EnKF inversion model applied to tsunami deposits for estimation of transient flow depth and speed with quantified uncertainties. *Marine Geology*, 2016, In press. DOI: [10.1016/j.margeo.2016.11.009](https://doi.org/10.1016/j.margeo.2016.11.009)
13. H. Xiao, **J.-X. Wang** and P. Jenny., An implicitly consistent formulation of a dual-mesh hybrid LES/RANS method. *Communications in Computational Physics*, 21(2), 570-599, 2017. DOI: [10.4208/cicp.220715.150416a](https://doi.org/10.4208/cicp.220715.150416a)
14. J.-L. Wu, **J.-X. Wang**, and H. Xiao. A Bayesian calibration-prediction method for reducing model-form uncertainties with application in RANS simulations. *Flow, Turbulence and Combustion*, 97, 761-786, 2016. DOI: [10.1007/s10494-016-9725-6](https://doi.org/10.1007/s10494-016-9725-6)
15. H. Xiao, **J.-X. Wang** and P. Jenny. Dynamic evaluation of mesh resolution and its application in hybrid LES/RANS methods. *Flow, Turbulence and Combustion*, 93(1), 141-170, 2014. DOI: [10.1007/s10494-014-9541-9](https://doi.org/10.1007/s10494-014-9541-9)
16. G.-N. Chu, S. Yang, and **J.-X. Wang**. Mechanics condition of thin-walled tubular component with rib hydroforming. *Transactions of Nonferrous Metals Society of China*, s280-s286. S2, 2012, DOI: [10.1016/S1003-6326\(12\)61720-8](https://doi.org/10.1016/S1003-6326(12)61720-8)
17. **J.-X. Wang**, G.-N. Chu, C.-L. Yu, G.-X. Wang, and H.-B. Gui, General study on prediction of welding distortion of construction in naval architecture. *Ship Engineering*, S2, 2011. (In Chinese)

18. G.-X. Wang, Z.-K. Hu, H.-B. Gui, P.-P. Xia, **J.-X. Wang**. Strength calculation of SL151 crane ship and structural strengthening program. *China Shiprepair*. 2012;4:019. ([In Chinese](#))

Peer-Reviewed Conference Articles

1. J. Wu, **J.-X. Wang**, S. C. Shadden, Adding Adding Constraints to Bayesian Inverse Problems, 2019 AAAI Conference on Artificial Intelligence (Acceptance Rate: 16.9%), 2019
2. **J.-X. Wang**, J.-L. Wu, J. Ling, G. Iaccarino and H. Xiao. Towards a Complete Framework of Physics-Informed Machine Learning for Predictive Turbulence Modeling. In *Center for Turbulence Research (Stanford University). Proceedings of the Summer Program*, 2016.
3. J. Huang, L. Duan, **J.-X. Wang**, R. Sun and H. Xiao. High-Mach-Number Turbulence Modeling using Machine Learning and Direct Numerical Simulation Database. In *AIAA SciTech*, 2017.
4. H. Xiao, J.-L. Wu, **J.-X. Wang**, and E.G. Paterson. Physics-Informed Machine Learning for Predictive Turbulence Modeling: Progress and Perspectives. In *AIAA SciTech*, 2017.
5. J.-L. Wu, **J.-X. Wang**, H. Xiao and E.G. Paterson, Visualization of High Dimensional Turbulence Simulation Data using t-SNE, In *AIAA SciTech*, 2017.

Invited Talks

1. **J.-X. Wang**, Data-enabled computational physics, Invited Seminar in Applied and Computational Mathematics and Statistics Department, *University of Notre Dame*, Notre Dame, Indiana, Nov. 29, 2018.
2. **J.-X. Wang**, Bayesian inverse problems in biomedicine, Invited talk at ND-PUC Minisymposium on Uncertainty Quantification, *University of Notre Dame*, Notre Dame, Indiana, Aug. 20, 2018.
3. **J.-X. Wang**, Physics-Informed, Data-Driven Framework for Model-Form Uncertainty Estimation and Reduction in RANS Simulations, Invited Seminar in Aerospace and Mechanical Department, *University of Notre Dame*, Notre Dame, Indiana, Mar. 8, 2017.

Conference Presentations and Abstracts

1. **J.-X. Wang**, X. Hu, S. Shadden. Data-augmented Multiscale Modeling of Intracranial Pressure Dynamics. *The 13th World Congress in Computational Mechanics 2018*. NYC, New York, July. 23-27, 2018. (Mini symposium talk)
2. **J.-X. Wang**, X. Hu, J. Pyne, S. Shadden. Physical-model-based, data-driven approach toward noninvasive prediction of intracranial pressure. *SIAM Uncertainty Quantification Conference 2018*. Orange County, California, April. 15-19, 2018. (Mini symposium talk)
3. J.-L. Wu, C. Michelen, **J.-X. Wang**, H. Xiao, Reducing Model Discrepancies in Turbulent Flow Simulations with Physics-informed Machine Learning *SIAM Uncertainty Quantification Conference 2018*. Orange County, California, April. 15-19, 2018. (Mini symposium talk)
4. J.-L. Wu, C. Michelen, **J.-X. Wang**, H. Xiao, Physics-informed Machine Learning for Data-driven Turbulence Modeling *SIAM Uncertainty Quantification Conference 2018*. Orange County, California, April. 15-19, 2018. (Poster)
5. **J.-X. Wang**, C. Zhang, L. Duan., H. Xiao. Inferring Pre-shock Acoustic Field From Post-shock Pitot Pressure Measurement. *American Physical Society 70th Annual DFD Meeting*. Denver, Colorado, Nov. 20-22, 2017. (Contributed talk)

6. **J.-X. Wang**, J.-L. Wu, H. Xiao. A Data-Driven Approach to Quantify and Reduce Model-Form Uncertainty in Turbulent Flow Simulations. *SIAM Computational Science and Engineering Conference 2017*. Atlanta, Georgia, March 3rd, 2017. (Mini symposium talk)
7. **J.-X. Wang**, J.-L. Wu, H. Xiao, Reducing RANS Model Error Using Random Forest, *American Physical Society 69th Annual DFD Meeting*, Portland, Oregon, Nov.20-22, 2016. (Contributed talk)
8. **J.-X. Wang**, H. Xiao. A Random Matrix Approach for Quantifying Model-Form Uncertainties in Turbulence Modeling. *SIAM Uncertainty Quantification*. Lausanne, Switzerland, April 5-8, 2016. (Mini symposium talk)
9. **J.-X. Wang**, H. Xiao. A multi-model approach for uncertainty propagation and model calibration in CFD applications. *SIAM Computational Science and Engineering Conference 2015*. Salt Lake City, Utah, March 14-18, 2015. (Contributed talk)
10. **J.-X. Wang**, J.-L. Wu, H. Xiao. Reducing RANS Model Uncertainties Based on Random Forest. *Fall Fluid Mechanics Symposium 2016*. Blacksburg, Virginia, November 16, 2016. (Contributed talk)
11. **J.-X. Wang**, H. Xiao. Accounting for model discrepancies in uncertainty propagation with a multi-model strategy: proof of concept for CFD applications. *Fall Fluid Mechanics Symposium 2014*. Blacksburg, Virginia, November 11, 2014. (Contributed talk)
12. J.-L. Wu, **J.-X. Wang**, H. Xiao, Quantifying the Discrepancy in RANS Modeling of Reynolds Stress Eigenvectors System, *American Physical Society 69th Annual DFD Meeting*, Portland, Oregon, Nov.20-22, 2016.
13. H. Xiao, J.-L. Wu, **J.-X. Wang**, J. Ling, A Physics-Informed Machine Learning Framework for RANS-based Predictive Turbulence Modeling, *American Physical Society 69th Annual DFD Meeting*, Portland, Oregon, Nov.20-22, 2016.
14. J.-L. Wu, **J.-X. Wang**, H. Xiao, Model-Form Uncertainty Quantification in RANS Simulation of Wing-Body Junction Flow, *American Physical Society 68th Annual DFD Meeting*, Boston, Massachusetts, Nov.3-5, 2015.
15. H. Xiao, J. L. Wu, **J.-X. Wang**, R. Sun, C. J. Roy. Quantifying Model Form Uncertainties in Reynolds-Averaged Navier Stokes Equations: An Open-Box, Physics-Informed, Bayesian Approach, in the *13th US National Congress on Computational Mechanics (USNCCM 13)*, San Diego, California. July 26-31, 2015.
16. H. Tang, **J.-X. Wang**, R. Weiss, and H. Xiao., TSUFLIND-EnKF: Inversion of tsunami flow condition with quantified uncertainty, *2015 YCSEC meeting*, Newark, De, 27-29 July, 2015.
17. H. Tang, **J.-X. Wang**, R. Weiss, and H. Xiao., Inversion of tsunami characteristics: Estimation of transient flow depth and speed with quantified uncertainties, *2014 AGU Fall meeting*, San Francisco, California, Dec.13-17, 2014.

SCHOLARLY REVIEWS

- Reviewer for *SIAM/ASA Journal on Uncertainty Quantification*
- Reviewer for *Computers and Geosciences*
- Reviewer for *Asian Journal of Control*

HONORS & AWARDS

- 2017 Travel grant for USACM Thematic Workshop on Uncertainty Quantification and Data-Driven Modeling.
- 2016 Summer Program Fellowship, Center For Turbulence Research (CTR) at Stanford University
- 2016 SIAM Student Travel Award for SIAM Conference on Uncertainty Quantification (UQ16)
- 2015 Student Travel Grant for Rocky Mountain Summer Workshop on Uncertainty Quantification, University of Colorado Denver
- 2013 Pratt Fellowship, Virginia Tech
- 2013 Outstanding Graduates of Heilongjiang Province (Top 3%)
- 2013 Best M.S. Thesis Award (1st place)
- 2012 National Graduate Fellowship in China (Top 1%)
- 2011 Outstanding Graduates of Harbin Institute of Technology (Top 5%)
- 2008/2009/2010/2011 People's Scholarship
- 2008/2009/2010/2011 Excellent Social Work Scholarship
- 2010 Excellent Leader of Harbin Institute of Technology
- 2009 Excellent League Member of Harbin Institute of Technology
- 2008 Outstanding Social Activist of Harbin Institute of Technology
- 2008 Excellent Association Worker
- 2007 Progress Scholarship