Yanyan He

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Research Interests Uncertainty Quantification, Uncertainty Modeling, Bayesian Methods, Computational Statistics, Monte Carlo Methods, Uncertainty Visualization, Uncertain Data Fusion, Fuzzy Sets, Fuzzy Measures

Employment

University of North Texas (UNT)

Associate Professor, Department of Math, and Department of CSE (Sep 2025 - present)
Assistant Professor, Department of Math, and Department of CSE (Aug 2019 - Aug 2025)

New Mexico Institute of Mining and Technology (NMT)

Assistant Professor, Department of Mathematics (Aug 2016 - Jul 2019)

The University of Utah

Postdoctoral Fellow, Scientific Computing and Imaging Institute (Feb 2014 - Jul 2016)
Advisors: Professor Mike Kirby and Professor Dongbin Xiu

Education

Florida State University

Ph.D., Applied and Computational Mathematics (Dec 2013)
M.S., Applied and Computational Mathematics (May 2010)
Advisor: Professor M. Yousuff Hussaini

Huazhong University of Science and Technology

M.S., Computational Mathematics (Dec 2007)
B.S., Computational Mathematics (Apr 2004)

Research

Funded Research Grants

- **Y. He** (Principal), J. Cain (Co-Principal), "Collaborative Research: Using uncertainty quantification and validated computational models to analyze pumping performance of valveless, tubular hearts," Sponsored by National Science Foundation, Federal, $249,453. (May 1, 2022 - April 30, 2025).
- **Y. He** (Principal), L. Waldrop (Co-Principal), "Using uncertainty quantification and machine learning techniques to study the evolution of odor capture.," Sponsored by Army Research Office, Federal, $247,995. (April 1, 2022 - March 31, 2025).
- L. Waldrop (Principal), **Y. He** (Co-Principal), "Investigation of the role of head morphology on odor detection using computational modeling," Sponsored by Office of Naval Research, Federal, $474,679. (May 1, 2021 - Jul 31, 2024).
- **Y. He** (Subrecipient Principal), U.S. Army Research Laboratory HBCU/MI Partnered Research Initiative program, "Material Design under Uncertainty", Sponsored by University of Utah, Federal, $346,500. (Nov 2016 - Nov 2020).

Publications in Refereed Journals

(Note: student authors are underlined, ⋆ denotes corresponding author)

1. <u>V. Chandrasekaran</u>, **Y. He**, <u>D. Ohara</u>, and Lindsay Waldrop. Sensitivity Analysis on Computational Model of Olfaction using Gaussian Process, Generalized Polynomial Chaos and Neural Networks. *Bulletin of Mathematical Biology*. Submitted.

2. **Y. He**, and L. D. Waldrop. Sensitivity and Uncertainty Analyses for Model of Olfaction using Dempster-Shafer Theory and Machine Learning Techniques. *Mathematical Biosciences*. Submitted.

3. N. Hebdon, **Y. He**, and L. D. Waldrop⋆. Getting the best performance out of functional performance landscapes. *Authorea Preprints*, 2023. DOI: 10.22541/au.169511170.07270983/v1.

4. **Y. He**⋆, N. Battista, and L. D. Waldrop. Mixed uncertainty analysis on pumping by peristaltic hearts using Dempster-Shafer theory. *Journal of Mathematical Biology*, 89(1)(2024): 13.

5. **Y. He**⋆, and M. Y. Hussaini. Mixed aleatory and epistemic uncertainty propagation using Dempster-Shafer theory. *Journal of Computational and Applied Mathematics*, 429(2023):115234.

6. <u>J. Chilleri</u>, **Y. He**⋆, D. Bedrov, and M. R. Kirby. Optimal allocation of computational resources based on Gaussian process: Application to molecular dynamics simulations. *Computational Materials Science*, 188(2021): 110178.

7. L. D. Waldrop⋆, **Y. He**, N. A. Battista, T. N. Peterman and L. A. Miller. Uncertainty quantification reveals the physical constraints on pumping by peristaltic hearts. *Journal of the Royal Society Interface*, 17(2020): 20200232.

8. L. D. Waldrop⋆, **Y. He**, T. L. Hedrick and J. Rader. Functional morphology of gliding flight I. Modeling reveals distinct performance landscapes based on soaring strategies. *Integrative and Comparative Biology*, 60(5)(2020): 1283–1296.

9. J. Rader⋆, T. L. Hedrick, **Y. He** and L. D. Waldrop. Functional morphology of gliding flight II. Morphology follows predictions of gliding performance. *Integrative and Comparative Biology*, 60(5)(2020): 1297-1308.

10. **Y. He**⋆, J. Chilleri, S. K. O'Leary, M. Shur and R. Kirby. Sensitivity analysis for an electron transport system: application to the case of wurtzite gallium nitride. *Journal of computational Electronics*, 19(1)(2020): 103-110.

11. M. Razi, <u>R. Wang</u>, **Y. He**, R. Kirby and L. Dal Negro⋆. Optimization of large-scale vogel spiral arrays of plasmonic nanoparticles. *Plasmonics*, 14(1)(2019): 253-261.

12. L. Waldrop, **Y. He** and S. Khatri. What can computational modeling tell us about the diversity of odor-capture structures in the pancrustacea? *Journal of Chemical Ecology*, 44(12)(2018): 1084-1100.

13. **Y. He**⋆, M. Razi, C. Forestiere, L. Dal Negro and R. Kirby. Uncertainty quantification guided robust design for nanoparticles' morphology. *Computer Methods in Applied Mechanics and Engineering*, 336(2018): 578-593.

14. <u>A. Bhaduri</u>, **Y. He**⋆, M. D. Shields, L. Graham-Brady and R. Kirby. Stochastic collocation approach with adaptive mesh refinement for parametric uncertainty analysis. *Journal of Computational Physics*, 371(2018): 732-750.

15. **Y. He** and D. Xiu*. Numerical strategy for model correction using physical constraints. *Journal of Computational Physics*, 313(2016): 617-634.

16. C. Forestiere*, **Y. He**, R. Wang, R. Kirby* and L. Dal Negro*. Inverse design of metal nanoparticles' morphology. *ACS Photonics*, 3(1)(2016): 68-78.

17. **Y. He**, M. Y. Hussaini, Y. Gong* and Y. Xiao. Optimal unified combination rule in application of Dempster-Shafer theory in lung cancer radiotherapy dose response outcome analysis. *Journal of Applied Clinical Medical Physics*, 17(1)(2016): 4-11.

18. X. Chen, **Y. He** and D. Xiu. An efficient method for uncertainty propagation using fuzzy sets. *SIAM Journal on Scientific Computing*, 37(6)(2015): A2488-A2507.

19. **Y. He***, M. Mirzargar, S. Hudson, R. M. Kirby and R. T. Whitaker. An uncertainty visualization technique using possibility theory: possibilistic marching cubes. *International Journal for Uncertainty Quantification*, 5(5)(2015): 433-451.

20. **Y. He***, M. Mirzargar and R. M. Kirby. Mixed aleatory and epistemic uncertainty quantification using fuzzy set theory. *International Journal of Approximate Reasoning*, 66(2015): 1-16.

21. C. Wang, Z. Qiu and **Y. He**. Fuzzy interval perturbation method for uncertain heat conduction problem with interval and fuzzy parameters. *International Journal for Numerical Methods in Engineering*, 104(52)(2015): 330-346.

22. C. Wang, Z. Qiu and **Y. He**. Fuzzy stochastic finite element method for the hybrid uncertain temperature field prediction. *International Journal of Heat and Mass Transfer*, 91(2015): 512-519.

23. **Y. He**, M. Y. Hussaini, J. Ma, B. Shafei and G. Steidl. A new fuzzy c-means method with total variation regularization for segmentation of images with noisy and incomplete data. *Pattern Recognition*, 45(9)(2012): 3463-3471.

24. W. Chen, Y. Cui, **Y. He**, Y. Yu, J. Galvin, M. Y. Hussaini and Y. Xiao. Application of Dempster-Shafer theory in dose response outcome analysis. *Physics in Medicine and Biology*, 57(17)(2012): 5575-5585.

25. **Y. He**, B. Shi and Y. Yang. Complete complementary codes based on shifted multiphase sequences (in Chinese). *Signal Processing*, 23(6)(2007): 941-945.

26. Y. Yang, B. Shi and **Y. He**. A class of unified constructions of sequence sets with zero (low) correlation zone (in Chinese). *Telemetry and Telecontrol*, 4(2007): 7-11.

Publications in Refereed Conference Proceedings

27. M. Chen, **Y. He**,, I. Chavarri, L. Waldrop. Distance between m-functions in Dempster-Shafer Theory. In: Huynh, VN., Honda, K., Le, B., Inuiguchi, M., Huynh, H.T. (eds) Integrated Uncertainty in Knowledge Modeling and Decision Making. IUKM 2025. Lecture Notes in Computer Science, vol 15586. Springer, Singapore.

28. K. Upadhyay, R. Dantu, **Y. He**, S. Badruddoja and A. Salau. Auditing Metaverse Requires Multimodal Deep Learning. Atlanta, GA: 2022 IEEE 4th International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (TPS-ISA).

29. S. Badruddoja, R. Dantu, **Y. He**, A. Salau, K. Upadhyay. Scalable Smart Contracts for Linear Regression Algorithm. 2022 International Conference on Blockchain Technology and Emerging Applications, pp. 19-31.

30. S. Badruddoja, R. Dantu, **Y. He**, Mark Thompson, <u>A. Salau</u>, <u>K. Upadhyay</u>. Trusted AI with Blockchain to Empower Metaverse. 2022 Fourth International Conference on Blockchain Computing and Applications (BCCA), San Antonio, TX, USA, 2022, pp. 237-244.

31. <u>S. Badruddoja</u>, R. Dantu, **Y. He**, Mark Thompson, <u>A. Salau</u>, <u>K. Upadhyay</u>. Smarter Contracts to Predict using Deep-Learning Algorithms. 2022 Fourth International Conference on Blockchain Computing and Applications (BCCA), San Antonio, TX, USA, 2022, pp. 280-288.

32. S. Badruddoja, R. Dantu, **Y. He**, Mark Thompson, <u>A. Salau</u>, <u>K. Upadhyay</u>. Making Smart Contracts Predict and Scale. 2022 Fourth International Conference on Blockchain Computing and Applications (BCCA), San Antonio, TX, USA, 2022, pp. 127-134. **Best Paper Award**.

33. <u>K. Upadhyay</u>, R. Dantu, **Y. He**, <u>S. Badruddoja</u> and <u>A. Salau</u>. Can't Understand SLAs? Use the Smart Contract. 2021 Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems and Applications (TPS-ISA), 2021, pp. 129-136.

34. <u>K. Upadhyay</u>, R. Dantu, **Y. He**, <u>A. Salau</u> and S. Badruddoja. Make Consumers Happy by Defuzzifying the Service Level Agreements. 2021 Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems and Applications (TPS-ISA), 2021, pp. 98-105.

35. <u>K. Upadhyay</u>, R. Dantu, **Y. He**, <u>A. Salau</u> and S. Badruddoja. Paradigm Shift from Paper Contracts to Smart Contracts,. New York: 2021 Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems and Applications (TPS-ISA), 2021, pp. 261-268

36. S. Badruddoja, R. Dantu, **Y. He**, <u>K. Upadhyay</u> and M. Thompson, "Making Smart Contracts Smarter," 2021 IEEE International Conference on Blockchain and Cryptocurrency (ICBC), 2021, pp. 1-3.

37. **Y. He** and M. Y. Hussaini. Constructing belief functions using the principle of minimum uncertainty. 2020 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), Glasgow, United Kingdom, 2020, pp. 1-7, doi: 10.1109/FUZZ48607.2020.9177795.

38. M. Mirzargar, **Y. He** and R. M. Kirby. Application of uncertainty modeling frameworks to uncertain isosurface extraction. IUKM 2015: 4th International Symposium on Integrated Uncertainty in Knowledge Modeling and Decision Making, Nha Trang, Vietnam, Oct 2015, Proceedings, V. Huynh, M. Inuiguchi and T. Denoeux (editors), Lecture Notes in Computer Science, 2015, 9376: 336-349.

39. **Y. He** and M. Y. Hussaini. An optimal unified combination rule. BELIEF2014: 3rd International Conference on Belief Functions, Oxford, UK, Sep 2014, Proceedings, F. Cuzzolin (editor), Lecture Notes in Artificial Intelligence, 2014, 8764: 39-48.

40. S. V. Poroseva, **Y. He**, M. Y. Hussaini and R. R. Mankbadi. Uncertainty quantification in the horizontal projection of flight plan trajectories using evidence theory. 13th AIAA Non-Deterministic Approaches Conference, AIAA2011-1759, Denver, CO, Apr 2011.

41. **Y. He**, M. Y. Hussaini, S. V. Poroseva and R. R. Mankbadi. Uncertainty quantification in flight plan horizontal path using evidence theory. Florida Center for Advanced Aero-propulsion (FCAAP) Annual Technical Symposium and Exhibition, Tallahassee, FL, Aug 2010.

42. S. V. Poroseva, **Y. He**, M. Y. Hussaini, J. J. Pesce and R. R. Mankbadi. Uncertainty quantification in flight plans using evidence theory: departure and arrival times. 12th AIAA Non-Deterministic Approaches Conference, AIAA2010-2678, Orlando, FL, Apr 2010.

Conferences and Invited Talks

- Uncertainty Analysis using Surrogates and Dempster-Shafer Theory. SIAM CSE, Fort Worth, Mar 2025.
- Uncertainty propagation and sensitivity analysis for biological systems. AMS Fall Central Sectional Meeting, San Antonio, Sep 2024.
- Mixed Uncertainty Analysis on Pumping by Peristaltic Hearts using Dempster-Shafer Theory. JMM, San Francisco, Jan 2024.
- Data-driven surrogate construction based on optimal allocation of computational resources. SIAM CSE, virtual, Mar 2021.
- Data-driven surrogate construction based on optimal allocation of computational resources and physical constraints. ARL MSME CRA Fall 2020 Seminar Series, virtual, Dec 2020.
- Constructing belief functions using the principle of minimum uncertainty. IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), Glasgow, United Kingdom, Jul 2020.
- Numerical Approaches and Applications for Uncertainty Quantification. Millican Colloquium, Department of Mathematics, UNT, Oct 2019.
- Non-probabilistic numerical approaches for uncertainty quantification. Millican Colloquium, University of North Texas, Denton, TX, Feb 2019.
- Numerical approaches and applications for uncertainty quantification. Math Colloquium, University of Washington Tacoma, Tacoma, WA, Feb 2019.
- Efficient numerical techniques and applications of uncertainty quantification. ARL MSME CRA Fall 2018 Seminar Series, virtual, Dec 2018.
- Numerical Strategy for Model Correction using Physical Constraints. SIAM Conference on Computational Science and Engineering, Atlanta, GA, Feb 2017.
- Inverse Design of Metal Nanoparticles' Morphology. Mach Conference, Annapolis, MD, Apr 2016.
- Uncertainty Quantification beyond Probabilistic Modeling. University of Massachusetts Dartmouth, Dartmouth, MA, Feb 2016.
- Non-probabilistic approaches for epistemic uncertainty quantification. SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ, Dec 2015.
- Uncertainty Quantification Using Dempster-Shafer Theory. Huazhong University of Science and Technology, Wuhan, Hubei, China, Jul 2015.
- An efficient method for uncertainty propagation using fuzzy sets. SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2015.
- SIAM Conference on Uncertainty Quantification, Savannah, GA, Mar 2014.
- Uncertainty quantification and data fusion using Dempster-Shafer theory. University of Utah, Salt Lake City, UT, Oct 2013.
- Uncertainty quantification and application of fuzzy measures. SUNY Buffalo, Buffalo, NY, Oct 2013.
- Data fusion based on evidence theory. The Second Pacific Rim Mathematical Association Congress, Shanghai, China, Jun 2013.
- Workshop on Advances in Computational Mathematics and Engineering, Tallahassee, FL, Sep 2012.
- SIAM Conference on Uncertainty Quantification, Raleigh, NC, Apr 2012.
- Uncertainty quantification in quasi-one-dimensional nozzle flow. Joint Mathematical Meeting,

Boston, MA, Jan 2012.

- Uncertainty quantification in flight plan horizontal path using evidence theory, Florida Center for Advanced Aero-propulsion (FCAAP) Annual Technical Symposium and Exhibition, Tallahassee, FL, Aug 2010.
- AIAA Non-Deterministic Approaches Conference, Orlando, FL, Apr 2010.

TEACHING **Course instructor for:**

MATH2700 - Linear Algrebra (UNT)
MATH3410 - Differential Equations I (UNT)
MATH5290/CSCE5230 - Numerical Methods (UNT)
MATH3350-Introduction to Numerical Analysis (UNT)
MATH352-Basic Concepts of Mathematics (NMT)
MATH410-Numerical Methods I (NMT)
MATH335-Ordinary Differential Equations (NMT)
MATH132-Calculus II (NMT)
MATH411-Numerical Linear Algebra (NMT)
MAC1140-Precalculus (FSU)

HONORS

- UNT TUF Award, 2025.

- UNT Math Faculty Research Award, 2023.

- Postdoctoral Travel Grant from University of Utah, Oct 2015.

- Travel Funding from NSF Grant administered at University of Washington, May 2013.

- Grad Student Travel Grant from AMS, Jan 2012.

- Grad Student Travel Grant from Florida State University, Jan 2012.