Huanhuan Yang

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No. 243 Daxue Road, Shantou, Guangdong, China 515063

Research Interests

- Numerical Partial Differential Equations: *Computational fluid dynamics, Cardiac electrophysiology, Boundary integral equations, Climate modeling*
- Reduced Order Modeling: *POD, CVT, Greedy reduced basis, Approximated Lax pairs*
- PDE-constrained Optimization: *Parameter estimation, Optimal control, Experimental design*
- Others: *HPC, Uncertainty quantification*

Education

Emory University, USA *Aug 2010 – Sep 2015*
- Ph.D. in Computational Mathematics
- Advisor: *Alessandro Veneziani*

Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences *Sep 2007 – Jun 2010*
- M.S. in Pure Mathematics
- Advisor: *Fangwen Deng*

Central China Normal University *Sep 2003 – Jun 2007*
- B.S. in Mathematics

Employment

Associate Professor at *Shantou University* *Aug 2017 – present*

Postdoctoral Research Associate at *Florida State University* *Sep 2015 – Aug 2017*
- Supervisor: *Max Gunzburger*

Research Intern at *Siemens Research Corporate*, Princeton *May – Aug 2014*
- Mentor: *Tiziano Passerini, Tommaso Mansi*

Research Grants

Publications

1. Nan Jiang and **Huanhuan Yang***, *Fast and accurate artificial compressibility ensemble algorithms for computing parameterized Stokes-Darcy flow ensembles*, **Journal of Scientific Computing**, 94(2023).

2. Ruonan Cao, Nan Jiang, and **Huanhuan Yang***, *Three linear, unconditionally stable, second order decoupling methods for the Allen-Cahn-Navier-Stokes phase field model*, **Journal of Mathematical Analysis and Applications**, 519(2023):126792.

3. Wei Gong, Buyang Li, **Huanhuan Yang***, *Optimal control in a bounded domain for wave propagating in the whole space: coupling through boundary integral equations*, **Journal of Scientific Computing**, 92(2022):91.

4. Nan Jiang and **Huanhuan Yang***, *Artificial compressibility SAV ensemble algorithms for the incompressible Navier-Stokes equations*, **Numerical Algorithms**, 2022.

5. Nan Jiang and **Huanhuan Yang***, *Numerical investigation of two second-order, stabilized SAV ensemble methods for the Navier-Stokes equations*, **Advances in Computational Mathematics** 48(2022):65.

6. Nan Jiang, Ying Li*, **Huanhuan Yang**, *A second order ensemble method with different subdomain time steps for simulating coupled surface-groundwater flows*, **Numerical Methods for Partial Differention Equations**, 38(2022):1880-1907.

7. Nan Jiang, Ying Li, **Huanhuan Yang***, *An artificial compressibility Crank-Nicolson leap-frog method for the Stokes-Darcy model and application in ensemble simulations*, **SIAM Journal on Numerical Analysis**, 59(2021):401-428.

8. Nan Jiang and **Huanhuan Yang***, *Stabilized scalar auxiliary variable ensemble algorithms for parameterized flow problems*, **SIAM Journal on Scientific Computing**, 43(2021):A2869-A2896.

9. Nan Jiang and **Huanhuan Yang***, *SAV decoupled ensemble algorithms for fast computation of Stokes-Darcy flow ensembles*, **Computer Methods in Applied Mechanics and Engineering**, 387 (2021):114150.

10. **Huanhuan Yang***, Lili Ju, Max Gunzburger, *Fast spherical centroidal Voronoi mesh generation: A Lloyd-preconditioned LBFGS method in parallel*, **Journal of Computational Physics**, 367(2018):235-252.

11. Kui Du, Buyang Li*, Weiwei Sun, **Huanhuan Yang**, *Electromagnetic scattering from a cavity embedded in an impedance ground plane*, **Mathematical Methods in the Applied Sciences**, 41(2018):7748-7765.

12. **Huanhuan Yang*** and Max Gunzburger, *Algorithms and analyses for stochastic optimization for turbofan noise reduction using parallel reduced-order modeling*, **Computer Methods in Applied Mechanics and Engineering**, 319(2017):217-239.

13. **Huanhuan Yang*** and Alessandro Veneziani, *Efficient estimation of cardiac conductivities via POD-DEIM model order reduction*, **Applied Numerical Mathematics**, 115(2017):180–199.

14. **Huanhuan Yang** and Alessandro Veneziani*, *Estimation of cardiac conductivities in ventricular tissue by a variational approach*, **Inverse Problems**, 31(2015):115001.

15. **Huanhuan Yang***, Tiziano Passerini, Tommaso Mansi, and Dorin Comaniciu, *Data-driven model reduction for fast, high fidelity atrial electrophysiology computations*, Functional Imaging and Modeling of the Heart, **Lecture Notes in Computer Science**, 9126(2015):466-474.

16. Lifang Xu* and **Huanhuan Yang**, *On the generalizations of Denjoy-Wolff theorem*, **Acta Mathematica Sinica, English Series**, 32 (2012):1333-1337.

US Patent

- H. Yang, T. Passerini, B. Georgescu, T. Mansi, D. Comaniciu. *System and Method for Patient-Specific Image-Based Simulation of Atrial Electrophysiology*. **US Patent App. No. US20160058520, granted in 2019**.

Presentations

- "An artificial compressibility CNLF method for the Stoke–Darcy model and application in ensemble simulations", 2022 Annual Meeting of Guangdong Society of Computational Mathematics, Dec. 17-18, 2022.

- "An artificial compressibility CNLF method for the Stoke–Darcy model and application in ensemble simulations", 2021 Academic Annual Meeting of China Mathematical Association, Kunming, China, Oct. 22-27, 2021.

- "Problems in patient-specific modeling of electrocardiology", Youth Forum on Numerical Algorithms for Delay Systems and Related Problems, Wuhan, China, Oct. 25-28, 2019.

- "PDE-constrained Optimization in Electrocardiology", China Annual Conference of Computational Mathematics, Haerbin, China, July 31-Aug. 4, 2019.

- "Electromagnetic scattering from a cavity embedded in an impedance ground plane", China Annual Conference of Computational Mathematics, Haerbin, China, July 31-Aug. 4, 2019.

- "Optimal control in a bounded domain for wave propagating in the whole space", The 28th Biennial Numerical Analysis Conference, Glasgow, UK, June 25-28, 2019.

- "Centroidal Voronoi mesh generation by a Lloyd-preconditioned LBFGS method", International Conference on Mathematical Modeling and Numerical Methods, Qingdao, China, May 30-June 2, 2019.

- "Fast SCVT grid generation: a Lloyd-preconditioned LBFGS method in parallel", 2017 All-Hands ACME PI Meeting, Maryland, US, Jun 5-7, 2017.

- "Stochastic optimal control for turbofan noise reduction with parallel reduced order modeling", SIAM Conference on Computational Science and Engineering, Atlanta, US, February 27-March 3, 2017.

- "Model and solution reduction techniques for patient-specific parameter estimation in cardiovascular mathematics: failure and success", Applied Inverse Problems Conference in 2015, Helsinki, Finland, May 25-29, 2015

- "Atrial Fibrillation Modeling and Data-Driven Cell Model Reduction", group meeting of Imaging & Computer Vision at Siemens Corporate Research, Princeton, Aug 2014

- "Order Reduced Methods for Cardiac Conductivities Estimation", 3rd International Conference on Computational & Mathematical Biomedical Engineering, Hong Kong, December 16-18, 2013

- "Variational Estimation of Cardiac Conductivities by a Data Assimilation Procedure", 12th U.S. National Congress on Computational Mechanics, Raleigh, North Carolina, US, July 22-25, 2013

- "Conductivity Parameters Estimation for the Cardiac Bidomain Model", 5th Annual JohnFest/SIAM Student Conference, Clemson, South Carolina, US, February 8-9, 2013

Conference Minisymposium Organizer

- H. Yang, K. Pieper. **Stochastic optimization with differential equations: methods and applications** (minisymposium), SIAM Conference on Computational Science and Engineering, February 27–March 3, 2017.

- L. Bertagna, H. Yang, A. Veneziani. **Inverse problems in cardiovascular mathematics** (minisymposium), 3rd International Conference on Computational & Mathematical Biomedical Engineering, Hong Kong, December 16–18, 2013.

Honors & Awards

- Excellent Instructor Award of the 2019 National Undergraduate Mathematical Modeling Contest Guangdong Branch, *Department of Education of Guangdong Province, China Association of Industry and Applied Mathematics*   *2019*

- Excellent Instructor Award of the 2018 National Undergraduate Mathematical Modeling Contest Guangdong Branch, *Department of Education of Guangdong Province, China Association of Industry and Applied Mathematics*   *2018*

- Chris Schoettle Graduate Research Award, *Emory University*   *2015*

Computer Skills

- Programming:
    - Operating systems: Linux (Ubuntu, Mint), Windows
    - Programming languages: C/C++, Python, Fortran, Java
    - Parallel computing: Message Passing Interface (MPI), CUDA (GPU)
    - Version control software tool: Git, TortoiseSVN
    - Build automation tools: CMake, Visual Studio
    - Software debug/profiling: Gdb, Valgrind

- Scientific Computing Libraries:
    - Developer of the finite element library LifeV (www.lifev.org)
    - Expert user of the Trilinos, Suitesparse libraries.

- Scientific Tools: LifeV, FreeFem++, MFEM, Paraview, Netgen, Gmsh, Matlab, R, Mathematica

Teaching Activities

Location	Time	Course	Students	Teaching Style	Review
Shantou U	Fall 2022	Linear Algebra and Analytic Geometry I	Fremen		94.98
Shantou U	Fall 2022	Numerical PDE	Master,PhD	English textbook	—
Shantou U	Spring 2022	Function of Real Variable	Junior		97
Shantou U	Spring 2022	Numerical Linear Algebra	Master,PhD	English textbook	—
Shantou U	Fall 2021	Linear Algebra and Analytic Geometry I	Fremen	Bilingual	93.58
Shantou U	Fall 2021	Numerical PDE	Master,PhD	English textbook	—
Shantou U	Spring 2021	Calculus C-II	Fremen		96.07
Shantou U	Spring 2021	Linear Algebra and Analytic Geometry II	Fremen	Bilingual	98.10
Shantou U	Spring 2020	Numerical PDE	Master,PhD	English textbook	—
Shantou U	Spring 2020	Linear Algebra and Analytic Geometry II	Fremen	Bilingual	96.56
Shantou U	Fall 2019	Advanced Calculus	Sophomore		96.49
Shantou U	Fall 2019	Mathematical Modeling in Practice	Junior		96.79
Shantou U	Spring 2019	Numerical Methods for Inverse Problems	PhD	English textbook	—
Shantou U	Spring 2019	Mathematical Models	Sophomore		94.17
Shantou U	Fall 2018	Advanced Calculus	Sophomore		95.96
Shantou U	Fall 2018	Mathematical Modeling in Practice	Junior		97.67
Shantou U	Spring 2018	Function of Real Variable	Junior		96.49
Shantou U	Spring 2018	Mathematical Models	Sophomore		94.03
Shantou U	Fall 2017	Function of Complex Variable	Sophomore		91.13
Emory U	Summer 2015	Calculus I	Freshmen	in English	—
Emory U	Fall 2014	Intro. Probability and Statistics	Freshmen	in English	—
Emory U	Fall 2013	Calculus I	Freshmen	in English	—
Emory U	Spring 2012	Calculus I	Freshmen	in English	—
Emory U	Spring 2015	Life Sciences Calculus II	Freshmen	Lab Instructor	—
Emory U	Spring 2013	Life Sciences Calculus II	Freshmen	Lab Instructor	—
Emory U	Fall 2012	Life Sciences Calculus I	Freshmen	Lab Instructor	—

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