John Steinman

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Dept. of Computational Applied Mathematics & Operations Research
Rice University
Houston, TX 77005

Education

Ph.D., Computational & Applied Mathematics (expected) May 2027
Rice University
Advisor: Matthias Heinkenschloss
GPA: 4.0

B.S. Computational Engineering May 2022
The University of Texas at Austin
GPA: 3.98

B.S. Mathematics May 2022
The University of Texas at Austin
GPA: 3.98

Research Experience

Graduate Student Researcher, Rice University Aug 2022-Present
Dept. of Computational Applied Mathematics & Operations Research
- Researched optimization of nonlinear biophysical models for single neuron cells
- Developed framework for parameter estimation in large-scale ordinary differential equation models
- Investigated spline-fitting methods for initializing full state from single observed variable
- Studied impact of collocation representation on numerical solution and post optimality analyses

Undergraduate Student Researcher, The University of Texas at Austin Sep 2020-May 2022
Willerson Center for Cardiovascular Modeling and Simulation
- Modeled hydrogel media used to study aortic valve interstitial cells (AVICs)
- Developed inverse finite element framework to estimate spatially varying material parameters
- Implemented three-field energy formulation to mitigate effects of numerical locking

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Publications

Alex Khang, John Steinman, Robin Tuscher, Xinzeng Feng, and Michael S. Sacks. "Estimation of aortic valve interstitial cell-induced 3D remodeling of poly(ethylene glycol) hydrogel environments using an inverse finite element approach". In: *Acta Biomaterialia* 160 (2023), pp. 123–133. ISSN: 1742-7061. DOI: https://doi.org/10.1016/j.actbio.2023.01.043

Conference Proceedings

John Steinman, Alex Khang, Xinzeng Feng, and Michael S. Sacks. "Simulation of the Local Mechanical Behavior of 3D Poly(ethylene glycol) Hydrogels For Studying Cell Mechanics". Gulf Coast Undergraduate Research Symposium, Rice University. 2021

Honors and Awards

Ken Kennedy Institute Computational Science and Engineering Recruiting Fellowship 2022-Present
Rice University
- $15,000 awarded over 4 years

Dr. Hans M. Mark Scholars Endowment in Engineering Honors 2018-2022
The University of Texas at Austin
- $56,000 awarded over 4 years

H. Bascom Funchess Jr. Scholarship 2018-2022
The University of Texas at Austin
- $12,000 awarded over 4 years

Distinguished College Scholar The University of Texas at Austin 2019-2022

University Honors, The University of Texas at Austin 2018-2022

National Merit Scholarship 2018
- $1,500 award

Professional Experience

Summer Intern, Firefly Aerospace, Cedar Park, TX June 2020-Aug 2022
Guidance, Navigation, and Control Team
- Used NASA Trick software to optimize flight system parameters via Monte Carlo simulation
- Researched quaternion-based attitude representations used in reaction control systems (RCS)
- Implemented RCS algorithms using phase plane drift channels and jet selection logic
- Parsed and analyzed binary telemetry data using C++

Summer Intern, MD Anderson Cancer Center, Houston TX June 2019-Aug 2019
Department of Biostatistics
- Performed statistical analysis of gene expression data from breast cancer patients
- Utilized unsupervised clustering algorithms to identify breast cancer subtypes
- Analyzed clustering results with supervised classification

Service

After-School Coach, Score Athletics, Austin, TX Jan 2020-Dec 2020
- Coached after-school sports at elementary schools in under-served communities
- Taught communication, leadership, and teamwork skills through drills and scrimmages

Academic Coach, Ramshorn Scholar Program, Austin, TX Jan 2020-Sep 2020
The University of Texas at Austin
- Mentored freshmen students in the Cockrell School of Engineering
- Helped students adjust to college life through weekly meetings and discussions
- Assisted students in classes through supplemental instruction and academic coaching

Academic Tutor, The University of Texas at Austin Jan 2020-May 2020
- Tutored calculus, differential equations, physics, chemistry, and other engineering classes
- Developed communication skills to help students understand difficult concepts
- Adapted teaching style to meet the unique needs of each student

Projects

Computational Fluid Dynamics (CFD) Project   Jan 2021-May 2021
- Derived governing equations for Taylor-Couette flow between coaxial cylinders
- Used OpenFOAM to solve the incompressible, laminar, transient flow regime
- Investigated effects of Reynolds number on flow stability and appearance of Taylor vortices

Texas Rocket Engineering Lab Recovery Subteam   Sep 2019-May 2020
- Contributed to design of rocket capable of reaching 100 km in altitude
- Developed computational framework to estimate landing zone using Monte Carlo simulation
- Researched and tested parachute deployment mechanisms and nose cone integration

Disease Propagation Modeling Project   Aug 2019-Dec 2019
- Used C++ to develop computational disease model of Austin population
- Simulated and analyzed propagation of disease by infecting initial percentage of the population and changing duration of infection, probability of transmission, number of interactions, etc.

Skills

Programming: Python, C++, Linux, MATLAB, Julia, R, FORTRAN
Software: FEniCS, Jax, ParaView, OpenFOAM, SolidWorks, Git, LaTeX, Excel, Word, PowerPoint

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References

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(Undergraduate research mentor)