John Steinman

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Education

Ph.D., Computational Applied Mathematics and Operations Research (expected) May 2027

Rice University
Advisor: Matthias Heinkenschloss
GPA: 4.0

M.A., Computational Applied Mathematics and Operations Research Dec. 2024
Rice University
Advisor: Matthias Heinkenschloss
GPA: 4.0

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

Research and Work Experience

Rice University Graduate Student Researcher, Aug 2022-Present
Dept. of Computational Applied Mathematics & Operations Research
- Researched optimization for optimal control problems with model inexactness

Sandia National Laboratories, Summer Intern, June 2024-Aug 2024
Optimization and Uncertainty Quantification
- Researched preconditioning for spectral collocation methods
- Performed computational studies using the Rapid Optimization Library (ROL)

Oden Institute for Computational Engineering and Sciences Undergraduate Student Researcher, Sep 2020-May 2022
The University of Texas at Austin
- Developed a computational framework for estimating material parameters in hydrogel media

Firefly Aerospace, Cedar Park, TX Summer Intern, June 2020-Aug 2022
Guidance, Navigation, and Control Team
- Worked on rocket trajectory optimization and flight parameter tuning

MD Anderson Cancer Center, Houston TX Summer Intern, June 2019-Aug 2019
Department of Biostatistics
- Developed statistical models for breast cancer diagnoses based on gene expression data

Publications

1. Aurya Javeed, Drew P. Kouri, Denis Ridzal, and John D. Steinman. A Preconditioner for Spectral Collocation. *SIAM J. Sci. Comput.*, 47(5):A2828–A2850, 2025. doi:10.1137/24M1712539

2. A. Javeed, D. P. Kouri, D. Ridzal, I. M. Ross, and J. D. Steinman. Matrix-free linear algebra for trajectory optimization. Submitted to Journal of Guidance, Control, and Dynamics, 2024. URL: https://arxiv.org/abs/2509.01855

3. J. D. Steinman. Convergence results and a new preconditioner for spectral collocation in time. Master's thesis, Department of Computational Applied Mathematics and Operations Research, Rice University, Houston, TX, 2024

4. A. Khang, J. Steinman, R. Tuscher, X. Feng, and M. S. Sacks. Estimation of aortic valve interstitial cell-induced 3d remodeling of poly(ethylene glycol) hydrogel environments using an inverse finite element approach. *Acta Biomaterialia*, 160:123–133, 2023. doi:10.1016/j.actbio.2023.01.043

Talks and Presentations

1. J. Steinman. Rockafellian relaxation for optimization problems with model inexactness. Presentation, Research Training Group in Numerical Mathematics and Scientific Computing at Rice University Annual Workshop, 3 Oct. 2025, Houston, TX

2. J. Steinman. Matrix-free linear algebra for trajectory optimization. Presentation, 8th Annual Meeting of the SIAM Texas-Louisiana Section, 26 Sept. 2025, Austin, TX

3. J. Steinman. A scalable collocation method for trajectory optimization. Presentation, Research Training Group in Numerical Mathematics and Scientific Computing at Rice University Annual Ranch Retreat, 4 May. 2025, Houston, TX

4. J. Steinman. Matrix-free linear algebra for trajectory optimization. Presentation, Lamar University EXPO 2024 Conference, 23 Apr. 2025, Beaumont, TX

5. J. Steinman. Matrix-free linear algebra for trajectory optimization. Presentation, East Coast Optimization Meething (ECOM), 18 Apr. 2025, Arlington, VA

6. J. Steinman. Matrix-free linear algebra for trajectory optimization. Presentation, 2025 SIAM Conference on Computational Science and Engineering (CSE25), 4 Mar. 2025, Fort Worth, TX

7. J. Steinman. A preconditioner for spectral collocation. Poster, 7th Annual Meeting of the SIAM Texas-Louisiana Section, 11 Oct. 2024, Waco, TX

8. J. Steinman. On the convergence of collocation methods for initial value problems. Presentation, Research Training Group in Numerical Mathematics and Scientific Computing at Rice University Annual Workshop, 8 Oct. 2024, Houston, TX

9. J. Steinman. On the convergence of collocation methods for initial value problems. Presentation, Research Training Group in Numerical Mathematics and Scientific Computing at Rice University Annual Ranch Retreat, 20 April 2024, Houston, TX

10. J. Steinman. Impact of representation of collocation methods on dynamic optimization problems. Poster, 6th Annual Meeting of the SIAM Texas-Louisiana Section, 4 Nov. 2023, Lafayette, LA

11. J. Steinman. Impact of representation of collocation methods on dynamic optimization problems. Poster, Research Training Group in Numerical Mathematics and Scientific Computing at Rice University Annual Workshop, 13 Oct. 2023, Houston, TX

12. J. Steinman, A. Khang, X. Feng, and M. S. Sacks. Simulation of the local mechanical behavior of 3d poly(ethylene glycol) hydrogels for studying cell mechanics. Presentation, Annual Gulf Coast Undergraduate Research Symposiuma at Rice University, Oct. 16, 2021, Houston, TX, 2021

Honors and Awards

Best Oral Presentation in Graduate STEM April 2025
Lamar University Spring Expo 2025

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

Service

SIAM Student Chapter President, Rice University Aug 2025-Present
- Organized SIAM graduate student events and managed chapter finances

Ranch Retreat Organizer, Rice University Jan 2024-April 2024
Research Training Group (RTG) in Numerical Mathematics and Scientific Computing
- Organized first annual RTG Ranch Retreat in Houston, TX
- Invited graduate student and postdoctoral speakers from other universities

Graduate Recruitment Organizer, Rice University Feb 2024
Dept. of Computational Applied Mathematics & Operations Research
- Organized visit weekends for prospective Ph.D. students

Academic Coach, The University of Texas at Austin Jan 2020-Sep 2020
Ramshorn Scholar Program
- Mentored freshmen engineering students and provided supplemental course instruction

Teaching

Teaching Assistant, Rice University Aug 2022-Present
Dept. of Computational Applied Mathematics & Operations Research
- CMOR 304 (Differential Equations), Spring 2026

Grader, Rice University Aug 2022-Present
Dept. of Computational Applied Mathematics & Operations Research
- CMOR 433/533 (Numerical Optimization), Spring 2025
- CMOR 431/531 (Convex Optimization), Fall 2024
- CMOR 421/521 (High Performance Computing), Spring 2024
- CMOR 420/520 (Computational Science), Fall 2023
- CAAM 336 (Differential Equations), Fall 2022, Spring 2023

Academic Tutor, The University of Texas at Austin Jan 2020-May 2020
- Calculus, differential equations, physics, chemistry, and other engineering classes

Skills

Programming: Python, C++, Linux, MATLAB, Julia, R, FORTRAN

Software: FEniCS, Jax, ParaView, OpenFOAM, SolidWorks, Git, LaTeX, Excel, Word, PowerPoint

References

Matthias Heinkenschloss, Ph.D.
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Rice University
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Alex Khang, Ph.D.
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University of Colorado Boulder
Boulder, CO 80309
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alex.khang@colorado.edu
(Undergraduate research mentor)