Jonathan Cangelosi

(PhD candidate in computational and applied mathematics)

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EDUCATION

Rice University, Houston, TX
Ph.D. in Computational and Applied Mathematics, *expected* May 2025.
Grad Certificate in Teaching and Learning, Center for Teaching Excellence, *expected* May 2025.
M.A. in Computational and Applied Mathematics, December 2022.

Louisiana State University (LSU), Baton Rouge, LA
B.S. in Mathematics (with Honors), December 2019.
B.S. in Computer Science (with Honors), December 2019.

TEACHING EXPERIENCE

Teaching assistant, Rice University Spring 2023, Spring 2024
Numerical methods for PDEs, undergraduate level. Held weekly recitation sessions and office hours, and also gave occasional guest lectures.

Kernel methods reading group facilitator, Rice University Spring 2024
Gave lectures and demonstrations on kernel methods from theoretical and practical perspectives for interested undergraduate and graduate students.

Lead tutor, LSU Center for Academic Success Fall 2017-Winter 2019
Tutored math and computer science courses spanning the curriculum, plus intro-level physics.

Peer tutoring, LSU Computer Science Fall 2017-Winter 2019
Assisted students in various computer science classes on the LSU Computer Science Discord server.

RESEARCH EXPERIENCE

Research assistant, Rice University Summer 2021-present
Advisor: Dr. Matthias Heinkenschloss
Studied trajectory optimization for hypersonic vehicles under AFOSR Grant FA9550-22-1-0004.

RESEARCH INTERESTS

Dynamical systems, optimal control, surrogate modeling, model reduction

MENTORSHIP EXPERIENCE

Informal CMOR undergraduate mentorship, Rice University Spring 2024
Mentored an undergraduate student studying feedback control systems with an interest in surrogate modeling.

SERVICE

Research Training Group (RTG)
Summer Math Days volunteer, Rice University Summer 2024
Gave a presentation to high school students discussing how mathematicians reason about infinity, which is foundational to college-level mathematics.

RTG Summer Internship volunteer, Rice University Summer 2024
Developed coding notebooks to teach high school students about discretizing and solving numerical optimization problems in Python using software such as scipy and Pyomo.

Graduate seminar organizer, Rice University Fall 2023-Spring 2024
Invited speakers and arranged weekly research talks for graduate students in the department.

Rice Association for Women in Mathematics (AWM) Chapter
Math Nights volunteer, Rice University Fall 2021
Assisted undergraduate students in applied mathematics courses such as calculus, matrix analysis, and numerical methods for PDEs.

PRESENTATIONS

Minisymposium presentation at MORe 2024, University of California at San Diego
Title: An Adaptive Surrogate Model Refinement Framework for Simulation and Optimization of Dynamical Systems

Minisymposium presentation at MOPTA 2024, Lehigh University
Title: An Adaptive Surrogate Model Refinement Framework for Optimization of Dynamical Systems

Poster presentation at NSF CompMath PI Meeting 2024, University of Washington
Title: Surrogate Model Refinement for Simulation of Dynamical Systems

Technical paper presentation at AIAA SciTech 2024, Hyatt Regency Center, Orlando
Title: Simultaneous Design and Trajectory Optimization for Boosted Hypersonic Glide Vehicles
Co-author: Jacob Needels, Stanford University

Minisymposium presentation at SIAM-TXLA 2023, University of Louisiana at Lafayette
Title: Adaptive Gaussian Process Modeling for Trajectory Simulation with Model Inexactness

Poster presentation at SIAM-TXLA 2022, University of Houston
Title: Trajectory Optimization of Hypersonic Vehicles via a Radau Pseudospectral Method

PUBLICATIONS

An Adaptive Surrogate Model Refinement (ASMR) Framework for Simulation and Optimization of Dynamical Systems
Ph.D. thesis. Work in progress. Expected completion date: May 2025.

Sensitivity-Driven Adaptive Surrogate Modeling for Dynamic Simulation with Model Discrepancy
Technical paper (tentative title). Work in progress.

Sensitivity of ODE Solutions with Respect to Component Functions in the Dynamics
Technical paper (tentative title). Work in progress.

Simultaneous Design and Trajectory Optimization for Boosted Hypersonic Glide Vehicles
Technical paper. Co-author: Jacob Needels, Stanford University. Published by AIAA SciTech 2024.

Trajectory Optimization of Hypersonic Vehicles via a Radau Pseudospectral Method
Master's thesis. Published by Rice University 2023.

TECHNICAL SKILLS

Programming with particular expertise in Python, including numpy, scipy, IPOPT, Jax, and Pyomo.