Amy de Castro

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Salt Lake City, Utah

EDUCATION

• **Doctor of Philosophy in Mathematical Sciences** *May 2025*
Clemson University Clemson, SC
   ◦ Dissertation: Numerical Modeling for Thin Film Polymers and Domain Decomposition for Coupled Systems of Fluid-Structure Interaction

• **Master of Science in Mathematical Sciences** *May 2020*
Clemson University Clemson, SC
   ◦ Thesis: Modeling and Optimization of Self-Healing Polymers

• **Bachelor of Science in Mathematics, Honors** *May 2018*
Union University Jackson, TN
   ◦ Thesis: Determining Unique Local Minima in Fitting Models of Complex Systems

TEACHING EXPERIENCE

• **MATH 1220 – Calculus II** *Spring 2026*

• **STAT 3090** *Spring 2025*
   ◦ *Graduate teacher of record*

• **MATH 1080 – Calculus II** *Spring 2024*
   ◦ *Graduate teacher of record; supervised an undergraduate teaching assistant*

• **MATH 1060 – Calculus I** *Fall 2023*
   ◦ *Graduate teacher of record; honors section*

• **STAT 2220 – Statistics in Everyday Life** *Fall 2022*
   ◦ *Graduate teacher of record*

• **MATH 1010 – Essential Mathematics for the Informed Society** *Fall 2021, Spring 2022*
   ◦ *Graduate teacher of record*

• **STAT 2300 – Statistical Methods I** *Fall 2018*
   ◦ *Teaching assistant for three lab sections*

RESEARCH EXPERIENCE

• **University of Utah** *July 2025 - present*
   ◦ Postdoctoral researcher

• **Sandia National Labs: year-round graduate intern** *May 2021 – August 2025*
   ◦ Developing and implementing partitioned methods for coupling full and reduced order models

• **Clemson University** *Fall 2021 – May 2025*
   ◦ Developing and analyzing Lagrange multiplier based partitioned methods and reduced order modeling for fluid interaction systems with linear elastic and poroelastic structures
   ◦ Partially supported by the NSF under grant number DMS-2207971

• **Clemson University** *January 2019 – July 2021*
   ◦ Exploring modeling and optimization of self-healing process for thin film polymers
   ◦ Joint project with the Materials Science and Engineering department
   ◦ Supported by National Science Foundation EPSCoR Program under NSF Award # OIA-1655740 and J. E. Sirrine Foundation Endowment at Clemson University

• **Brigham Young University: Research Experience for Undergraduates** *Summer 2017*
   ◦ Investigating uniqueness of potential local minima in complex systems by construction of geodesic paths

Peer-Reviewed Journal and Proceedings Publications

[1] A. de Castro, H. Lee, and M.M. Wiecek. **A Lagrange multiplier method for fluid-structure interaction: Well-posedness and domain decomposition**. *Computer & Mathematics with Applications*, Vol. 181, pp. 193-215 (2025).

[2] A. de Castro, H. Lee, and M.M. Wiecek. **Reduced order modeling for a Schur complement method for fluid-structure interaction**. *Journal of Computational Physics*, Vol. 515, pp. 113282 (2024).

[3] A. de Castro and P. Kuberry. **Comparing stability of partitioned heterogeneous time integration methods involving index-2 DAEs resulting from high-order AM and BDF schemes**. In *Computer Science Research Institute Summer Proceedings 2024*, M. B. P. Adams, T. A. Casey, and B. W. Reuter, eds., Technical Report SAND2024-16688O, Sandia National Laboratories, pp. 14-25 (2024).

[4] A. de Castro, P. Bochev, P. Kuberry, and I. Tezaur. **Explicit synchronous partitioned scheme for coupled reduced order models based on composite reduced bases**. *Computer Methods in Applied Mechanics and Engineering*, Vol. 417, pp. 116398 (2023).

[5] A. de Castro, P. Kuberry, I. Tezaur, and P. Bochev. **A novel partitioned approach for reduced order model – finite element model (ROM-FEM) and ROM-ROM coupling**. In *Earth and Space 2022*, pp. 475-489 (2022).

[6] A. de Castro, P. Kuberry, I. Tezaur, and P. Bochev. **A synchronous partitioned scheme for coupled reduced order models based on separate reduced order bases for the interior and interface variables**. In *Computer Science Research Institute Summer Proceedings 2022*, S.K. Seritan and J.D. Smith, eds., Technical Report SAND2022-10280R, Sandia National Laboratories, pp. 78-92 (2022).

[7] A. de Castro, P. Kuberry, and P. Bochev. **Partitioned solution of a coupled reduced order model – finite element model (ROM-FEM model) for a transmission problem**. In *Computer Science Research Institute Summer Proceedings 2021*, J.D. Smith and E. Galvan, eds., Technical Report SAND2022-0653R, Sandia National Laboratories, pp. 24-37 (2021).

Preprints and Publications in Submission

[1] A. de Castro and H. Lee. **Convergence analysis and a preconditioned partitioned method for the Stokes-Biot system with Lagrange multipliers.** In submission. Preprint available on arXiv.

[2] A. de Castro and H. Lee. **Well-posedness of a novel Lagrange multiplier formulation for fluid-poroelastic interaction.** In submission. Preprint available on arXiv.

Presentations

- **Young Mathematicians in Model Order Reduction** *May 2026*
  ◦ Reduced order modeling for fluid interaction systems with elastic or poroelastic structures — Blacksburg, VA

- **27th Conference of the International Linear Algebra Society** *May 2026*
  ◦ Analogies between reduced order modeling and numerical linear algebra — Blacksburg, VA

- **SIAM Conference on Uncertainty Quantification** *March 2026*
  ◦ Predictive Reduced-Order Modeling in Coupled Systems of PDEs — Minneapolis, MN

- **Eleventh Annual Graduate Student Mini-Conference in Computational Mathematics** *April 2024*
  ◦ Partitioned scheme and reduced order modeling for fluid interaction systems with poroelastic structures — Clemson, SC

- **2nd IACM Mechanistic Machine Learning and Digital Engineering for CSE and Technology** *Sept. 2023*
  ◦ A Lagrange multiplier partitioned scheme for coupled reduced order models based on composite reduced bases — El Paso, TX

- **SIAM Conference on Computational Science and Engineering** *March 2023*
  ◦ A partitioned method for ROM-FEM and ROM-ROM couplings with separate reduced bases for interior and interface variables — Amsterdam, Netherlands

- **Tenth Annual Graduate Student Mini-Conference in Computational Mathematics** *Dec. 2022*
  ◦ A partitioned method for the solution of fluid-structure interaction and ROM implementation — Auburn, AL

- **Women in Scientific Computing on Complex Physical and Biological Systems** *Oct. 2022*
  ◦ Poster: A partitioned method for the solution of fluid-structure interaction: methodology and reduced order modeling — Gainesville, FL

- **World Congress on Computational Mechanics** *July 2022*
  ◦ Formulation of partitioned schemes with non-standard computational models — Virtual

- **Copper Mountain Conference on Iterative and Multigrid Methods** *April 2022*
  ◦ A novel partitioned approach for reduced order model – finite element model (ROM-FEM) and ROM-ROM coupling — Virtual

- **Earth and Space Conference** *April 2022*
  Denver, CO

- A novel partitioned approach for reduced order model – finite element model (ROM-FEM) and ROM-ROM coupling

- **SIAM Southeastern Atlantic Section Conference** *Sept. 2021*
  - Partitioned solution of a coupled ROM-FEM model for a transmission problem *Virtual*

- **MADE in SC: All-Faculty Meeting and Research Fellows Conference** *Sept. 2019*
  - Poster: Experiment meets mathematics: Modeling of self-healing polymers *Columbia, SC*

- **MAA Southeastern Section 2018 Spring Meeting** *March 2018*
  - Determining unique local minima in complex systems *Clemson, SC*

PROFESSIONAL SERVICE AND DEVELOPMENT

- **Mentor for Spelman-Morehouse DRP**
  - Mentored undergraduate student in a reading/research project (Spring 2026)

- **Society of Industrial and Applied Mathematics**
  - Served as Clemson chapter president (May 2022 – May 2024) and treasurer (May 2019 – May 2022)

- **Kappa Mu Epsilon, Mathematics Honor Society**
  - Served as Union University chapter president (April 2017 – April 2018)

- **Participated in graduate student book club for teaching effectiveness**
  - Through Clemson Office of Teaching Effectiveness and Innovation (Spring 2025)

AWARDS AND SCHOLARSHIPS

- **Michael Case travel award** *Oct. 2022*
- **SIAM student chapter service award** *May 2022*
- **Science Graduate Recruiting Fellowship** *Aug. 2018*
- **Academic Excellence Award for Math** *May 2018*
- **Wolfram Award in Computational Science** *May 2015*
- **Union University Presidential Scholar** *Aug. 2014*

PROGRAMMING LANGUAGES

- **Matlab, Python**
- **Basic knowledge of C++ and deal.ii**

REFERENCES

1. **Dr. Hyesuk Lee**
   Professor, School of Mathematical and Statistical Sciences
   Clemson University
   Email: hklee@clemson.edu

2. **Dr. Margaret Wiecek**
   Professor, School of Mathematical and Statistical Sciences
   Clemson University
   Email: wmalgor@clemson.edu

3. **Dr. Meredith Burr**
   Principal Lecturer, School of Mathematical and Statistical Sciences
   Clemson University
   Email: burr3@clemson.edu

4. **Dr. Paul Kuberry**
   Principal Member of Technical Staff
   Sandia National Laboratories
   Email: pakuber@sandia.gov

5. **Dr. Pavel Bochev**
   Senior Scientist
   Sandia National Laboratories
   Email: pbboche@sandia.gov