

# CURRICULUM VITAE

## PABLO SELESON

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### CONTACT INFORMATION

Oak Ridge National Laboratory  
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Oak Ridge, TN 37831, USA

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### RESEARCH INTERESTS

- Peridynamics and related nonlocal models
- Multiscale modeling and adaptivity
- Anisotropic and plane elasticity models
- Computational fracture modeling
- Uncertainty quantification and statistical methods
- Social networks and machine learning

### EDUCATION

**Florida State University**, Tallahassee, Florida, USA

- ▷ **Ph.D., Computational Science** 08/2010  
Dissertation: *“Peridynamic multiscale models for the mechanics of materials: constitutive relations, upscaling from atomistic systems, and interface problems”*  
Advisor: Dr. Max Gunzburger  
GPA: 4.00/4.00

**Hebrew University of Jerusalem**, Jerusalem, Israel

- ▷ **M.S., Physics** 08/2006  
Thesis: *“The Buildup of Galaxies in Dark-Matter Halos”*  
Advisor: Dr. Avishai Dekel  
GPA: 4.32/4.35
- ▷ **B.S., Physics, Philosophy** 08/2002  
Magna cum Laude  
GPA: 4.09/4.35

### RESEARCH EXPERIENCE

**Oak Ridge National Laboratory**, Oak Ridge, TN, USA

- ▷ **Research Scientist** 10/2020-present  
*Multiscale Methods and Dynamics Group*  
*Mathematics in Computation Section*  
*Computer Science and Mathematics Division*
- ▷ **Research Scientist** 08/2016-09/2020  
*Computational and Applied Mathematics Group*  
*Computer Science and Mathematics Division*
- ▷ **Alston S. Householder Fellow** 08/2014-07/2016  
*Computational and Applied Mathematics Group*  
*Computer Science and Mathematics Division*

**The University of Texas at Austin, Austin, TX, USA**

▷ **ICES Postdoctoral Fellow** 09/2010-07/2014

*Work under the supervision of Dr. J. Tinsley Oden,  
Institute for Computational Engineering and Sciences*

- Developed mathematical schemes and software prototypes for the coupling of local and nonlocal models in solid mechanics, in collaboration with *Sandia National Laboratories*
- Developed phase-field driven, goal-oriented model-adaptivity methods for blending schemes in concurrent multiscale modeling
- Built coarse-grained models for polymer materials, based upon OPLS potentials, calibrated through Bayesian inversion with LAMMPS all-atom simulation data
- Studied analytically and computationally interface problems for nonlocal diffusion models and their applications to multiscale systems

**Sandia National Laboratories, Albuquerque, NM, USA**

▷ **Summer Intern** 05/2008-08/2008

*Worked with Dr. Michael L. Parks,  
Computer Science Research Institute*

- Implemented the peridynamics state-based theory in the PDLAMMPS code
- Completed computational experiments comparing peridynamics (as an upscaled molecular dynamics model) to fully molecular dynamics experiments

**Florida State University, Tallahassee, Florida, USA**

▷ **Research Assistant** 08/2006-05/2007

*Worked with Dr. Raúl Tempone,  
Department of Scientific Computing*

- Applied Smolyak and tensor product quadratures to high-dimensional integrations
- Developed parallel implementations using MPI

**Institute of Astrophysics of Paris, Paris, France**

▷ **Research Assistant** 01/2005-03/2005

*Worked with Dr. Avishai Dekel*

- Performed statistical analysis of N-body and hydrodynamical simulations
- Provided quantitative and qualitative descriptions of cold flows through shocks

**Hebrew University of Jerusalem, Jerusalem, Israel**

▷ **Research Assistant** 10/2001-06/2002

*Worked with Dr. Amir Sa'ar,  
Department of Applied Physics*

- Performed ellipsometric measurements of thin layer structures in porous silicon
- Developed numerical algorithms to compute dielectric properties of materials

**Weizmann Institute of Science, Rehovot, Israel**

▷ **Summer Intern** 07/2001-09/2001

*Worked with Dr. Mordehai Heiblum,  
Department of Condensed Matter Physics*

- Performed measurements of shot noise
- Developed alternative techniques for the spectrum analyzer

## TEACHING EXPERIENCE

### **The University of Texas at Austin, Austin, TX, USA**

- ▷ **Instructor** Spring 2012  
*Department of Aerospace Engineering and Engineering Mechanics*  
Course: “Dynamics”
- Prepared and gave class lectures (92 students)
  - Coordinated two teaching assistants
  - Designed and graded exams, and assigned homeworks
  - Held office hours

### **The University of Texas at Austin, Austin, TX, USA**

- ▷ **Lecturer and Teaching Assistant** Spring 2011  
*Institute for Computational Engineering and Sciences*  
Course: “Finite Element Methods”  
Instructor: Dr. Serge Prudhomme
- Gave some of the class lectures (11 students)
  - Provided assistance to students with the homeworks

### **The University of Texas at Austin, Austin, TX, USA**

- ▷ **Teaching Assistant** Fall 2010  
*Institute for Computational Engineering and Sciences*  
Course: “Introduction to Mathematical Modeling in Science and Engineering”  
Instructor: Dr. J. Tinsley Oden
- Graded homeworks and exams (11 students)
  - Assisted with class notes

### **Hebrew University of Jerusalem, Jerusalem, Israel**

- ▷ **Teaching Assistant** 03/2003-07/2005
- Taught X-ray diffraction by crystals to 20 undergraduate physics majors
  - Guided students through experimental steps
  - Graded reports and colloquiums

### **Maayanot Institute, Jerusalem, Israel**

- ▷ **Mathematics Supervisor** 10/2005-07/2006
- Supervised a special project for high school students, to improve their performance on qualifying exams
  - Assisted in the design of educational programs, organized monthly meetings, and audited teachers’ performance
  - Organized and supervised a summer math camp

### **Maayanot Institute, Jerusalem, Israel**

- ▷ **Teaching Assistant** 03/2000-10/2005
- Taught quarterly intensive math workshops in high schools and elementary schools, each consisting of roughly 30 students

- Participated in evaluation and training meetings
- Prepared reports and evaluations

**Jewish Agency for Israel, Jerusalem, Israel**

▷ **Teacher** 07/2000-08/2000

- Taught high school physics and mathematics to 25 summer students
- Graded exams and assignments

**ORT High School, Buenos Aires, Argentina**

▷ **Teaching Assistant** 03/1997-08/1997

- Gave support to high school math teachers during classes (30 students)
- Provided individual in-class help to students

**TRAVEL AWARDS**

- SIAM travel award 2013  
U.S. National Science Foundation  
Society for Industrial and Applied Mathematics  
SIAM Conference on Analysis of Partial Differential Equations
- USNCCM-12 travel award 2013  
12th U.S. National Congress on Computational Mechanics
- Early career travel award 2013  
U.S. National Science Foundation  
Society for Industrial and Applied Mathematics  
Conference on Mathematical Aspects of Materials Science
- IPAM travel award 2012  
Institute for Pure and Applied Mathematics, UCLA  
Program on Materials Defects: Mathematics, Computation, and Engineering
- USACM travel award 2012  
10th World Congress on Computational Mechanics
- SIAM travel award 2011  
U.S. National Science Foundation  
Society for Industrial and Applied Mathematics  
International Congress on Industrial and Applied Mathematics
- USNCCM-11 travel award 2011  
11th U.S. National Congress on Computational Mechanics
- “US Junior Oberwolfach Fellows” grant 2011  
U.S. National Science Foundation  
Mathematisches Forschungsinstitut Oberwolfach  
Mini-Workshop: Mathematical Analysis for Peridynamics
- Student travel award 2010  
Society for Industrial and Applied Mathematics  
Conference on Mathematical Aspects of Materials Science

**HONORS AND AWARDS**

- CSMD Annual Award: Outstanding Community Development 2019  
“For his work on building a community for computational mechanics”

- and peridynamic methods”*  
Computer Science and Mathematics Division (CSMD)  
Oak Ridge National Laboratory
- Member of the Computational Mechanics Committee 2019-present  
Engineering Mechanics Institute  
American Society of Civil Engineers
  - Vice-Chair of the Technical Thrust Area: “Large Scale 2019-present  
Structural Systems and Optimal Design”  
United States Association for Computational Mechanics
  - Visiting Scientist Scholarship 2018  
University of Padova, Padova, Italy
  - Member of the Technical Thrust Area: “Large Scale Structural 2015-2019  
Systems and Optimal Design”  
United States Association for Computational Mechanics
  - Alston S. Householder Fellowship in Scientific Computing 2014  
Oak Ridge National Laboratory
  - ICES Postdoctoral Fellowship 2010
  - StudentStar nomination (Florida State University) 2009
  - Student paper prize 2009  
Society for Industrial and Applied Mathematics  
The 33rd SIAM Southeastern-Atlantic Section Annual Meeting
  - Member of the Honor Society of Phi Kappa Phi 2008
  - Member of Golden Key International Honour Society 2007
  - Graduate Student Scholarship for Academic Excellence 2003-2004  
Faculty of Natural Sciences, Hebrew University of Jerusalem

#### JOURNAL PAPERS

1. Jeremy Trageser and **Pablo Seleson**, “*Anisotropic Two-Dimensional, Plane Strain, and Plane Stress Models in Classical Linear Elasticity and Bond-Based Peridynamics*”, Submitted, 2019, arXiv:1905.12761.
2. Greta Ongaro, **Pablo Seleson**, Ugo Galvanetto, Tao Ni, and Mirco Zaccariotto, “*Overall Equilibrium in the Coupling of Peridynamics and Classical Continuum Mechanics*”, Computer Methods in Applied Mechanics and Engineering, Accepted, 2020.
3. [Invited Review Paper] Marta D’Elia, Xingjie Li, **Pablo Seleson**, Xiaochuan Tian, and Yue Yu, “*A Review of Local-to-Nonlocal Coupling Methods in Nonlocal Diffusion and Nonlocal Mechanics*”, Journal of Peridynamics and Nonlocal Modeling, In Press, 2020.
4. Arman Shojaei, Alexander Hermann, **Pablo Seleson**, and Christian J. Cyron, “*Dirichlet Absorbing Boundary Conditions for Classical and Peridynamic Diffusion-type Models*”, Computational Mechanics, 66, pp. 773–793, 2020.
5. Jeremy Trageser and **Pablo Seleson**, “*Bond-Based Peridynamics: A Tale of Two Poisson’s Ratios*”, Journal of Peridynamics and Nonlocal Modeling, 2, pp. 278–288, 2020.
6. Amit Katiyar, Shivam Agrawal, Hisanao Ouchi, **Pablo Seleson**, John T. Foster, and Mukul M. Sharma, “*A General Peridynamics Model for Multiphase Transport of Non-Newtonian Compressible Fluids in Porous Media*”, Journal of Computational Physics, 402, p. 109075, 2020.

7. Bo Ren, C.T. Wu, **Pablo Seleson**, Danielle Zeng, and Dandan Lyu, “A Peridynamic Failure Analysis of Fiber-Reinforced Composite Laminates Using Finite Element Discontinuous Galerkin Approximations”, *International Journal of Fracture*, 214(1), pp. 49–68, 2018.
8. Marco Pasetto, Yu Leng, J.S. Chen, John T. Foster, and **Pablo Seleson**, “A Reproducing Kernel Enhanced Approach for Peridynamic Solutions”, *Computer Methods in Applied Mechanics and Engineering*, 340, pp. 1044–1078, 2018.
9. **Pablo Seleson**, Qiang Du, and Michael L. Parks, “On the Consistency Between Nearest-Neighbor Peridynamic Discretizations and Discretized Classical Elasticity Models”, *Computer Methods in Applied Mechanics and Engineering*, 311, pp. 698–722, 2016.
10. **Pablo Seleson** and David J. Littlewood, “Convergence Studies in Meshfree Peridynamic Simulations”, *Computers and Mathematics with Applications*, 71(11), pp. 2432–2448, 2016.
11. Stewart A. Silling, David J. Littlewood, and **Pablo Seleson**, “Variable Horizon in a Peridynamic Medium”, *Journal of Mechanics of Materials and Structures*, 10(5), pp. 591-612, 2015.
12. **Pablo Seleson**, Youn Doh Ha, and Samir Beneddine, “Concurrent Coupling of Bond-Based Peridynamics and the Navier Equation of Classical Elasticity by Blending”, *International Journal for Multiscale Computational Engineering*, 13(2), pp. 91-113, 2015.
13. **Pablo Seleson**, “Improved One-Point Quadrature Algorithms for Two-Dimensional Peridynamic Models based on Analytical Calculations”, *Computer Methods in Applied Mechanics and Engineering*, 282, pp. 184-217, 2014.
14. **Pablo Seleson**, Michael L. Parks, and Max Gunzburger, “Peridynamic State-Based Models and the Embedded-Atom Model”, *Communications in Computational Physics*, 15(1), pp. 179-205, 2014.
15. **Pablo Seleson**, Max Gunzburger, and Michael L. Parks, “Interface Problems in Nonlocal Diffusion and Sharp Transitions between Local and Nonlocal Domains”, *Computer Methods in Applied Mechanics and Engineering*, 266, pp. 185-204, 2013.
16. **Pablo Seleson**, Samir Beneddine, and Serge Prudhomme, “A Force-Based Coupling Scheme for Peridynamics and Classical Elasticity”, *Computational Materials Science*, 66, pp. 34-49, 2013.
17. **Pablo Seleson** and Michael L. Parks, “On the Role of the Influence Function in the Peridynamic Theory”, *International Journal for Multiscale Computational Engineering*, 9(6), pp. 689-706, 2011.
18. **Pablo Seleson** and Max Gunzburger, “Bridging Methods for Atomistic-to-Continuum Coupling and Their Implementation”, *Communications in Computational Physics*, 7, pp. 831-876, 2010.
19. **Pablo Seleson**, Michael L. Parks, Max Gunzburger, and Richard B. Lehoucq, “Peridynamics as an Upscaling of Molecular Dynamics”, *Multiscale Modeling and Simulation*, 8, pp. 204-227, 2009.

#### BOOK CHAPTERS

1. **Pablo Seleson** and David J. Littlewood, “Numerical tools for improved convergence of meshfree peridynamic discretizations”, in *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, George Voyiadjis, ed., Springer, Cham, 2018.

2. **Pablo Seleson** and Michael L. Parks, “*Links between Peridynamic and Atomistic Models*”, in Handbook of Peridynamic Modeling, Florin Bobaru, John T. Foster, Philippe H. Geubelle, and Stewart A. Silling, eds., Taylor & Francis Group, Chapman and Hall/CRC, Publication date: November 3, 2016.
3. Yan Azdoud, Fei Han, David Littlewood, Gilles Lubineau, and **Pablo Seleson**, “*Coupling Local and Nonlocal Models*”, in Handbook of Peridynamic Modeling, Florin Bobaru, John T. Foster, Philippe H. Geubelle, and Stewart A. Silling, eds., Taylor & Francis Group, Chapman and Hall/CRC, Publication date: November 3, 2016.

#### TECHNICAL REPORTS

1. “*Workshop on Experimental and Computational Fracture Mechanics 2020*”, Patrick Diehl, Serge Prudhomme, and **Pablo Seleson**, eds., Technical Report ORNL/TM-2020/1714, November 2020.
2. David J. Littlewood, Stewart A. Silling, John A. Mitchell, **Pablo D. Seleson**, Stephen D. Bond, Michael L. Parks, Daniel Z. Turner, Damon J. Burnett, Jakob Ostien, and Max Gunzburger, “*Strong Local-Nonlocal Coupling for Integrated Fracture Modeling*”, Technical Report SAND2015-7998, Sandia National Laboratories, September 2015.
3. **Pablo Seleson**, Samir Beneddine, and Serge Prudhomme, “*A Force-Based Coupling Scheme for Peridynamics and Classical Elasticity*”, ICES Report 12-19, The University of Texas at Austin, 2012.
4. **Pablo Seleson**, Michael L. Parks, and Max Gunzburger, “*Peridynamics as an Upscaling of Molecular Dynamics*”, in CSRI Summer Proceedings, D. Ridzal and S. S. Collis, eds., Sandia National Laboratories, 2008, pp. 177-184. Available as Sandia National Laboratories Technical Report SAND2008-8257P.
5. Michael L. Parks, **Pablo Seleson**, Steven J. Plimpton, Richard B. Lehoucq, and Stewart A. Silling, “*Peridynamics with LAMMPS: A User Guide*”, Technical Report SAND 2008-0135, Sandia National Laboratories, January 2008.

#### PROCEEDINGS ARTICLES

1. Miroslav Stoyanov, **Pablo Seleson**, and Clayton Webster, “*A Surrogate Modeling Approach for Crack Pattern Prediction in Peridynamics*”, 19th AIAA Non-Deterministic Approaches Conference, AIAA SciTech Forum, (AIAA 2017-1326).
2. **Pablo Seleson** and Max Gunzburger, “*Bridging Methods and Boundary Treatment for AtC Coupling Problems*”, in Proc. of the 4th International Conference on Multiscale Materials Modeling, Anter El-Azab, ed., pp. 77-80, October 2008, Tallahassee, FL.

#### PRESENTATIONS IN CONFERENCES AND WORKSHOPS

1. “*Overall equilibrium in the coupling of peridynamics and classical continuum mechanics*”, invited talk, SIAM Conference on Computational Science and Engineering, March 1-5, 2021, Virtual Conference.
2. “*Toward validation of peridynamic failure models of fiber-reinforced composite laminates*”, invited talk, 14th World Congress on Computational Mechanics – 8th European Congress on Computational Methods in Applied Sciences and Engineering, January 11-15, 2021, Virtual Congress.

3. “Overall equilibrium in the coupling of peridynamics and classical continuum mechanics”, invited talk, ASME 2020 International Mechanical Engineering Congress & Exposition, November 16-19, 2020, Virtual Conference, Online.
4. “The evolution of the field of peridynamics” (video prepared by Biraj Dahal), invited talk, ASME 2020 International Mechanical Engineering Congress & Exposition, November 16-19, 2020, Virtual Conference, Online.
5. “Convergence studies in meshfree peridynamic crack propagation” (video prepared by Marco Pasetto), invited talk, ASME 2020 International Mechanical Engineering Congress & Exposition, November 16-19, 2020, Virtual Conference, Online.
6. “Overall equilibrium in the coupling of peridynamics and classical continuum mechanics”, invited talk, 3<sup>rd</sup> Annual Meeting of the SIAM Texas-Louisiana Section, October 16-18, 2020, Virtual Zoom Meeting.
7. “Convergence studies in meshfree peridynamic wave and crack propagation”, invited talk, Workshop on Experimental and Computational Fracture Mechanics, February 26-28, 2020, Baton Rouge, LA, USA.
8. “Toward validation of peridynamic failure models of fiber-reinforced composite laminates”, invited talk, ASME 2019 International Mechanical Engineering Congress & Exposition, November 11-14, 2019, Salt Lake City, UT, USA.
9. “Anisotropy in two-dimensional and planar elasticity bond-based peridynamics”, invited talk, ASME 2019 International Mechanical Engineering Congress & Exposition, November 11-14, 2019, Salt Lake City, UT, USA.
10. “Overall equilibrium in coupled FEM-PD models”, invited talk, ASME 2019 International Mechanical Engineering Congress & Exposition, November 11-14, 2019, Salt Lake City, UT, USA.
11. “Modeling material anisotropy in bond-based peridynamics”, invited talk, 43rd Annual Meeting of the SIAM Southeastern Atlantic Section, September 21-22, 2019, Knoxville, TN, USA.
12. “Bond-based peridynamics: A tale of two Poisson’s ratios”, invited talk, 15th U.S. National Congress on Computational Mechanics, July 28-August 1, 2019, Austin, TX, USA.
13. “Anisotropy in two-dimensional and planar elasticity bond-based peridynamics”, invited talk, Engineering Mechanics Institute Conference 2019, June 18-21, 2019, Caltech, Pasadena, CA, USA.
14. “Peridynamic models for anisotropic media”, invited talk, Workshop on Meshfree Method and Advances in Computational Mechanics, March 10-12, 2019, Pleasanton, CA, USA.
15. “Foundations of material anisotropy in classical elasticity and peridynamics”, invited talk, SIAM Conference on Computational Science and Engineering, February 25-March 1, 2019, Spokane, WA, USA.
16. “Convergence studies in meshfree peridynamic simulations”, invited talk, ASME 2018 International Mechanical Engineering Congress & Exposition, November 9-15, 2018, Pittsburgh, PA, USA.
17. “Anisotropy in two-dimensional and plane elasticity bond-based peridynamics”, invited talk, ASME 2018 International Mechanical Engineering Congress & Exposition, November 9-15, 2018, Pittsburgh, PA, USA.



18. “*Modeling material anisotropy with peridynamics*”, invited talk, ASME 2018 International Mechanical Engineering Congress & Exposition, November 9-15, 2018, Pittsburgh, PA, USA.
19. “*Coupling methods in peridynamics for effective failure and damage simulation*”, invited talk, USACM Thematic Conference on Meshfree and Particle Methods: Applications and Theory, September 10-12, 2018, Santa Fe, NM, USA.
20. “*Coupling methods in peridynamics for effective failure and damage simulation*”, invited talk, 13th World Congress on Computational Mechanics, July 22-27, 2018, New York City, NY, USA.
21. “*Modeling material anisotropy with peridynamics*”, invited talk, 18th U.S. National Congress for Theoretical and Applied Mechanics, June 4-9, 2018, Rosemont, IL, USA.
22. “*Convergence studies in meshfree peridynamic simulations*”, invited talk, Engineering Mechanics Institute Conference 2018, May 29-June 1, 2018, Cambridge, MA, USA.
23. “*Nonlocality in peridynamics across scales*”, invited talk, USACM Thematic Conference on Nonlocal Methods in Fracture, January 15-16, 2018, Austin, TX.
24. “*2D computations in peridynamics with MATLAB*”, Modeling, Analysis and Numerics for Nonlocal Applications Workshop, December 11-15, 2017, Santa Fe, NM, USA.
25. “*Numerical tools for improved convergence of meshfree peridynamic discretizations*”, invited talk, ASME 2017 International Mechanical Engineering Congress & Exposition, November 3-9, 2017, Tampa, FL, USA.
26. “*Peridynamic models for anisotropic media*”, invited talk, ASME 2017 International Mechanical Engineering Congress & Exposition, November 3-9, 2017, Tampa, FL, USA.
27. “*Nonlocal mechanics models for anisotropic media*”, invited talk, Nonlocal School on Fractional Equations, August 17-19, 2017, Ames, IA, USA.
28. “*Uncertainty quantification in materials modeling*”, invited talk, Workshop on Quantification of Uncertainty: Improving Efficiency and Technology, July 18-21, 2017, Trieste, Italy.
29. “*Peridynamic models for anisotropic media*”, invited talk, 14th U.S. National Congress on Computational Mechanics, July 17-20, 2017, Montréal, Canada.
30. “*Anisotropic bond-based peridynamic models*”, invited talk, Nonlocal Dynamics: Theory, Computation and Applications, June 4-9, 2017, Chicago, IL, USA.
31. “*Concurrent multiscale methods for local/nonlocal coupling*”, invited talk, Workshop on Non-local Material Models and Concurrent Multiscale Methods, April 3-7, 2017, Bonn, Germany.
32. “*Anisotropic bond-based peridynamic models*”, invited talk, 41st SIAM Southeastern Atlantic Section Conference, March 18-19, 2017, Tallahassee, FL, USA.
33. “*Blending methods for effective local/nonlocal coupling in materials modeling*”, invited talk, SIAM Conference on Computational Science and Engineering, February 27-March 3, 2017, Atlanta, GA, USA.
34. “*Surface effect analysis and correction in peridynamics*”, invited talk, ASME 2016 International Mechanical Engineering Congress & Exposition, November 11-17, 2016, Phoenix, AZ, USA.

35. “*On the consistency between nearest-neighbor peridynamic discretizations and discretized classical elasticity models*”, invited talk, ASME 2016 International Mechanical Engineering Congress & Exposition, November 11-17, 2016, Phoenix, AZ, USA.
36. “*On the consistency between nearest-neighbor peridynamic discretizations and discretized classical elasticity models*”, invited talk, USACM Thematic Conference on Isogeometric Analysis and Meshfree Methods, October 10-12, 2016, La Jolla, CA, USA.
37. “*Foundations Of Rigorous Mathematics for Uncertainty quantification in Large systems At The Extreme scale (FORMULATE)*” (co-presented with Clayton Webster), invited talk, DARPA EQUiPS Program Review Meeting, September 21-23, 2016, DARPA Conference Center, Arlington, VA, USA.
38. “*On the consistency between nearest-neighbor peridynamic discretizations and discretized classical elasticity models*”, invited talk, SIAM Conference on Nonlinear Waves and Coherent Structures, August 8-11, 2016, Philadelphia, PA, USA.
39. “*Surface effect analysis and correction in peridynamics*”, invited talk, 12th World Congress on Computational Mechanics – 6th Asia-Pacific Congress on Computational Mechanics, July 24-29, 2016, Seoul, Korea.
40. “*Multiscale coupling of peridynamics and classical continuum mechanics*”, invited talk, 9th International Conference on Fracture Mechanics of Concrete and Concrete Structures, May 28-June 1, 2016, Berkeley, CA, USA.
41. “*On the consistency between nearest-neighbor peridynamics and finite difference classical elasticity*”, invited talk, SIAM Conference on Mathematical Aspects of Materials Science, May 8-12, 2016, Philadelphia, PA, USA.
42. “*Peridynamic models for upscaling crystalline structures*”, contributed talk, SIAM Conference on Mathematical Aspects of Materials Science, May 8-12, 2016, Philadelphia, PA, USA.
43. “*Uncertainty inclusion and characterization in nonlocal theories for materials modeling*”, invited talk, SIAM Conference on Uncertainty Quantification, April 5-8, 2016, Lausanne, Switzerland.
44. “*Toward uncertainty quantification in multiscale materials simulations*”, invited talk, DARPA Open Manufacturing Review Meeting, February 16-18, 2016, Arlington, VA, USA.
45. “*Multiscale coupling methods in peridynamics*”, invited talk, Fifth Chilean Workshop on Numerical Analysis of Partial Differential Equations, January 11-15, 2016, Concepción, Chile.
46. “*Towards multiscale material modeling with peridynamics*” (Skype presentation), invited talk, Current Trends in Non-Classical Continuum Mechanics, December 14-15, 2015, Goa, India.
47. “*On the consistency between: nearest-neighbor peridynamics and discretized classical elasticity*”, invited talk, ASME 2015 International Mechanical Engineering Congress & Exposition, November 13-19, 2015, Houston, TX, USA.
48. “*Foundations Of Rigorous Mathematics for Uncertainty quantification in Large systems At The Extreme scale (FORMULATE)*” (Co-presented with Clayton Webster), invited talk, DARPA EQUiPS Kick-off Meeting, November 9-10, 2015, DARPA Conference Center, Arlington, VA, USA.

49. “*Multiscale coupling methods in peridynamics*”, invited talk, Workshop for Nonlocal Models in Mathematics, Computation, Science, and Engineering, October 26-28, 2015, Oak Ridge National Laboratories, Oak Ridge, TN, USA.
50. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, Advances in Scientific Computing and Applied Mathematics, October 9-12, 2015, Las Vegas, NV, USA.
51. “*Multiscale coupling of peridynamics and classical continuum mechanics by blending*”, invited talk, Eighth International Workshop on Meshfree Methods for Partial Differential Equations, September 7-9, 2015, Bonn, Germany.
52. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, The 8th International Congress on Industrial and Applied Mathematics, August 10-14, 2015, Beijing, China.
53. “*A consistent blending scheme to concurrently couple peridynamics and classical continuum mechanics*”, invited talk, The 8th International Congress on Industrial and Applied Mathematics, August 10-14, 2015, Beijing, China.
54. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, 13th U.S. National Congress on Computational Mechanics, July 26-30, 2015, San Diego, CA, USA.
55. “*A blending approach to concurrently couple peridynamics and classical continuum mechanics*”, invited talk, First Pan-American Congress on Computational Mechanics, April 27-29, 2015, Buenos Aires, Argentina.
56. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, Conference on Recent Developments in Continuum Mechanics and Partial Differential Equations, April 18-19, 2015, Lincoln, NE, USA.
57. “*A concurrent multiscale blending scheme for local/nonlocal coupling*”, invited talk, AMS Spring Southeastern Sectional Meeting, March 27-29, 2015, Huntsville, AL, USA.
58. “*A blending approach to concurrently couple peridynamics and classical continuum mechanics*”, invited talk, 13th International Symposium on Multiscale, Multifunctional and Functionally Graded Materials, October 19-22, 2014, Taua Resort, São Paulo, Brazil.
59. “*Concurrent coupling of peridynamics and classical continuum mechanics by blending*”, invited talk, 17th U.S. National Congress on Theoretical and Applied Mechanics, June 15-20, 2014, East Lansing, MI, USA.
60. “*Improved one-point quadrature algorithms for two-dimensional peridynamic models based on analytical calculations*”, invited talk, SIAM Conference on Analysis of Partial Differential Equations, December 7-10, 2013, Lake Buena Vista, FL, USA.
61. “*Concurrent coupling of bond-based peridynamics and Navier equation of classical elasticity by blending*”, invited talk, 12th U.S. National Congress on Computational Mechanics, July 22-25, 2013, Raleigh, NC, USA.
62. “*Concurrent coupling of bond-based peridynamics and Navier equation of classical elasticity by blending*”, invited talk, SIAM Conference on Mathematical Aspects of Materials Science, June 9-12, 2013, Philadelphia, PA, USA.
63. “*Interface problems in nonlocal diffusion and sharp transitions between local and nonlocal domains*”, invited talk, Workshop on Nonlocal Damage and Failure: Peridynamics and Other Nonlocal Models, March 11-12, 2013, San Antonio, TX, USA.

64. “*Mathematical modeling and analysis of interface problems for nonlocal diffusion*”, invited talk, 2013 Joint Mathematics Meetings, January 9-12, 2013, San Diego, CA, USA.
65. “*Concurrent multiscale modeling in peridynamics*”, invited talk, ASME 2012 International Mechanical Engineering Congress and Exposition, November 9-12, 2012, Houston, TX, USA.
66. “*Blending schemes for concurrent coupling of local and nonlocal continuum models in multiscale solid mechanics*”, invited talk, 49th Annual Technical Meeting of The Society of Engineering Science, October 10-12, 2012, Atlanta, GA, USA.
67. “*A force-based blending between peridynamics and classical elasticity*”, invited talk, 10th World Congress on Computational Mechanics, July 8-13, 2012, São Paulo, Brazil.
68. “*Multiscale modeling approaches in peridynamics*”, invited talk, 10th World Congress on Computational Mechanics, July 8-13, 2012, São Paulo, Brazil.
69. “*A force-based coupling scheme for peridynamics and classical elasticity*”, invited talk, SAMSI Nonlocal Continuum Models for Diffusion, Mechanics, and Other Applications Workshop, June 25-29, 2012, Research Triangle Park, NC, USA.
70. “*Concurrent coupling of nonlocal and local continuum models in peridynamics*”, invited talk, Workshop on Peridynamics, Dissipative Particle Dynamics and the Mori-Zwanzig Formulation, April 10-11, 2012, Providence, RI, USA.
71. “*A force-based blending of peridynamics and classical elasticity*”, invited talk, Colloquium: Advances in Computational Science, Engineering, and Mathematics, *Honoring the 75th Birthday of J. Tinsley Oden*, January 19-20, 2012, Austin, TX, USA.
72. “*Peridynamics as a multiscale material model*”, invited talk, 2011 AMS Fall Central Section Meeting, October 14-16, 2011, Lincoln, Nebraska, USA.
73. “*Interface problems in nonlocal multiscale modeling*”, invited talk, 11th US National Congress on Computational Mechanics, July 25-29, 2011, Minneapolis, Minnesota, USA.
74. “*Coupling local and nonlocal diffusion models across interfaces*”, invited talk, 7th International Congress on Industrial and Applied Mathematics, July 18-22, 2011, Vancouver, British Columbia, Canada.
75. “*Multiscale modeling in peridynamic solid mechanics*”, contributed talk, Workshop on Macroscopic Modeling of Materials with Fine Structure, May 26-28, 2011, Pittsburgh, Pennsylvania, USA.
76. “*Connecting peridynamic models and coupling local and nonlocal systems*”, invited talk, Mini-Workshop: Mathematical Analysis for Peridynamics, January 16-22, 2011, Oberwolfach-Walke, Germany.
77. “*A domain decomposition method for local/nonlocal coupling*”, invited talk, 16th US National Congress on Theoretical and Applied Mechanics, June 27-July 2, 2010, State College, Pennsylvania, USA.
78. “*A domain decomposition method for local/nonlocal coupling*”, invited talk, SIAM Conference on Mathematical Aspects of Materials Science, May 23-26, 2010, Philadelphia, Pennsylvania, USA.
79. “*Peridynamics as an upscaling of molecular dynamics*”, contributed talk, Second Conference on Applied, Computational and Industrial Mathematics, December 14-16, 2009, Rosario, Santa Fe, Argentina.

80. “*Peridynamics as an upscaling of molecular dynamics*”, contributed talk, The 2009 Joint ASCE-ASME-SES Conference on Mechanics and Materials, June 24-27, 2009, Blacksburg, Virginia, USA.
81. “*Peridynamics as an upscaling of molecular dynamics*”, invited talk, 33rd SIAM-SEAS Conference 2009, April 4-5, 2009, Columbia, South Carolina, USA.

#### INVITED LECTURES, SEMINARS, AND COLLOQUIA

1. “*Computational fracture modeling with peridynamics*”, Department of Mathematics Colloquium, January 28, 2020, Iowa State University, Ames, IA, USA.
2. “*Computational fracture modeling with peridynamics*”, Computational Mechanics Seminar Series, December 12, 2019, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
3. “*Peridynamics: A framework for fracture, multiscale, and complex materials modeling*”, Journal Club Seminar Series, October 11, 2019, Materials Theory Group, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
4. “*Numerical and modeling advances for peridynamic fracture computations*”, CSMD-CSED Seminar Series, March 6, 2019, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
5. “*Toward effective simulation of fracture in anisotropic media*”, December 14, 2018, Department of Industrial Engineering, University of Padova, Padova, Italy.
6. “*Concurrent multiscale methods for local/nonlocal coupling*”, December 7, 2018, Department of Industrial Engineering, University of Padova, Padova, Italy.
7. “*Toward effective simulation of fracture in anisotropic media*”, Computational Mechanics Special Seminar, May 11, 2018, Department of Structural Engineering, University of California, San Diego, La Jolla, CA, USA.
8. “*Mathematical & multiscale modeling in peridynamics*”, Modeling, Analysis and Numerics for Nonlocal Applications Workshop, December 11-15, 2017, Santa Fe, NM, USA.
9. “*Uncertainty quantification in materials modeling*” (co-presented with Miroslav Stoyanov), February 7, 2017, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, USA.
10. “*Convergence studies for nonlocal peridynamic models*”, Computational and Applied Mathematics Seminar, December 1, 2016, Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
11. “*Toward multiscale material modeling with peridynamics*”, Mechanical Engineering Seminar, April 18, 2016, Department of Mechanical Engineering, Technion–Israel Institute of Technology, Haifa, Israel.
12. “*Toward multiscale material modeling with peridynamics*”, Numerical Analysis Seminar, March 1, 2016, Department of Mathematics, University of Maryland, College Park, MD, USA.
13. “*Nonlocal models in solid mechanics: overview, applications, challenges, and multiscale modeling*”, Group meeting, June 23, 2015, Computational Data Analytics Group, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
14. “*Multiscale material modeling with mesoscopic models*”, Colloquium, February 5, 2014, Department of Computational and Applied Mathematics, Rice University, Houston, TX, USA.

15. “*Multiscale material modeling with mesoscopic models*”, Colloquium, January 23, 2014, Department of Mathematical Sciences, The University of Texas at El Paso, El Paso, TX, USA.
16. “*Multiscale material modeling with mesoscopic models*”, Colloquium, January 17, 2014, Department of Mathematics, Statistics and Computer Science, Marquette University, Milwaukee, WI, USA.
17. “*Bridging scales in materials with mesoscopic models*”, Computer Science and Mathematics Division Seminar, January 13, 2014, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
18. “*Multiscale material modeling with mesoscopic models*”, Mathematics Colloquium, December 3, 2013, Department of Mathematics, Kansas State University, Manhattan, KS, USA.
19. “*Multiscale material modeling with mesoscopic models*”, Collaboratory on Mathematics for Mesoscopic Modeling of Materials Webinar, Pacific Northwest National Laboratory, September 9, 2013.
20. “*Multiscale material modeling with peridynamics*”, Computer Science and Mathematics Division Seminar, May 31, 2013, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
21. “*Multiscale material modeling with peridynamics*”, Mathematics Colloquium, January 24, 2013, Department of Mathematics, University of Tennessee, Knoxville, TN, USA.
22. “*Coupling local and nonlocal continuum models by blending in peridynamics*”, IPAM MD2012 Seminar Series, October 18, 2012, Institute for Pure and Applied Mathematics, University of California, Los Angeles, CA, USA.
23. “*Bridging scales with nonlocal continuum models for applications to material failure and damage*”, Applied Math Seminar, November 27, 2012, Department of Mathematics, California State University, Northridge, CA, USA.
24. “*Nonlocal models in solid mechanics: overview, applications, challenges, and multiscale modeling*”, Mathematics Colloquium, September 28, 2012, Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE, USA.
25. “*Scientific research from a computational science perspective*”, Math Club, September 27, 2012, Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE, USA.
26. “*Bridging scales in solid mechanics: a new approach to concurrent multiscale modeling*”, Continuum Mechanics Seminar, September 27, 2012, Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE, USA.
27. “*Concurrent coupling of nonlocal and local continuum models in peridynamics*”, Computational and Applied Mathematics Colloquium, April 13, 2012, Mathematics Department, The Pennsylvania State University, State College, PA, USA.
28. “*A crash course on peridynamics: theory, applications, and challenges*”, CCMA Luncheon Seminar, April 13, 2012, Mathematics Department, The Pennsylvania State University, State College, PA, USA.
29. “*Peridynamics as a multiscale material model*”, Multiscale Modeling & Analysis Course, April 12, 2012, Mathematics Department, The Pennsylvania State University, State College, PA, USA.

30. “*Molecular dynamics at larger scales: peridynamics as an upscaling of molecular dynamics*”, Introductory SC Graduate Student Seminar, April 17, 2009, Department of Scientific Computing, Florida State University, Tallahassee, Florida, USA.
31. “*Introduction to software versioning, SVN & CVS*”, SCS technical topics series, October 10, 2007, School of Computational Science, Florida State University, Tallahassee, Florida, USA.
32. “*Managing software development using SVN, a case study*”, SCS technical topics series, February 28, 2007, School of Computational Science, Florida State University, Tallahassee, Florida, USA.

#### POSTER PRESENTATIONS

1. “*Concurrent multiscale algorithms for local/nonlocal coupling and its adaptivity*”, Workshop for Advances in Computational Sciences and Engineering, March 20-21, 2017, Austin, TX, USA.
2. “*Multiscale material modeling with mesoscopic models*”, Joint NSRC Workshop: Big, Deep, and Smart Data Analytics in Materials Imaging, June 8-10, 2015, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
3. “*A force-based coupling scheme for peridynamics and classical elasticity*”, Computational Methods for Multiscale Modeling of Materials Defects Workshop, December 3-7, 2012, Institute for Pure and Applied Mathematics, University of California, Los Angeles, CA, USA.
4. “*A force-based coupling scheme for peridynamics and classical elasticity*”, SAMSI Nonlocal Continuum Models for Diffusion, Mechanics, and Other Applications Workshop, June 25-29, 2012, Research Triangle Park, NC, USA.
5. “*Peridynamics as a multiscale material model*”, 2011 DOE Applied Mathematics Program Meeting, October 17-19, 2011, Reston, Virginia, USA.
6. “*Interface problems in nonlocal multiscale modeling*”, 11th US National Congress on Computational Mechanics, July 25-29, 2011, Minneapolis, Minnesota, USA.
7. “*On the role of the influence function in the peridynamic theory*”, Computational Expo 2010, April 14, 2010, Department of Scientific Computing, Florida State University, Tallahassee, Florida, USA.
8. “*Peridynamics as an upscaling of molecular dynamics*”, Computational Xposition 2009, April 14, 2009, Department of Scientific Computing, Florida State University, Tallahassee, Florida, USA.
9. “*Bridging methods and boundary treatment for AtC coupling problems*”, The Fourth International Conference on Multiscale Materials Modeling, October 27-31, 2008, Tallahassee, Florida, USA.
10. “*Peridynamics as an upscaling of molecular dynamics*”, Applied Mathematics Principal Investigators Meeting, October 15-17, 2008, Argonne, Illinois, USA.
11. “*Bridging methods and boundary treatment for AtC coupling problems*”, The 4th Annual Meeting of the Florida Society for Materials Simulation, May 5-7, 2008, Tallahassee, Florida, USA.
12. “*Bridging methods and boundary treatment for AtC coupling problems*”, Computational Xposition 2008, February 25, 2008, Department of Scientific Computing, Florida State University, Tallahassee, Florida, USA.

13. “The buildup of galaxies in dark-matter halos”, Nearly Normal Galaxies in a  $\Lambda$ CDM Universe conference, August 8-12, 2005, Santa Cruz, California, USA.

CONTRACTS AND GRANTS

- Oak Ridge National Laboratory** 2020  
*Computing and Computational Sciences Directorate*  
Workshop: Meshfree and Finite Element Methods with Applications  
Location: Berkeley, CA, USA  
Dates: September 27-29, 2020  
Website: <http://mfem2020.usacm.org>  
Total Award: \$10,000
- Oak Ridge National Laboratory** 2020  
*Computing and Computational Sciences Directorate*  
Workshop: Experimental and Computational Fracture Mechanics  
Location: Baton Rouge, LA, USA  
Dates: February 26-28, 2020  
Website: <http://wfm2020.usacm.org>  
Total Award: \$10,000
- USNC/TAM AmeriMech Symposia** 2020  
Workshop: Experimental and Computational Fracture Mechanics  
Location: Baton Rouge, LA, USA  
Dates: February 26-28, 2020  
Website: <http://wfm2020.usacm.org>  
Total Award: \$4,000
- U.S. Department of Energy** 2019  
*Vehicle Technologies Office (HPC4Materials Program)*  
Title: An Advanced Meso-Scale Peridynamic Modeling Technology using High-Performance Computing for Cost-Effective Product Design and Testing of Carbon Fiber Reinforced Polymer Composites in Light-weight Vehicles  
Role: National Laboratory Principal Investigator  
Industry PI: Danielle Zeng (Ford Motor Company)  
Total Award: \$300,000
- Oak Ridge National Laboratory** 2018-2019  
*Laboratory Directed Research & Development (LDRD)*  
Title: Advanced numerical methods for fracture modeling  
Role: Principal Investigator  
Total Award: \$595,000  
Co-PIs: L. Mu, M. Stoyanov, and J. Trageser (ORNL)
- Oak Ridge National Laboratory** 2018  
*Computer Science and Mathematics Division*  
Workshop: Nonlocal Methods in Fracture  
Location: Austin, TX, USA  
Dates: January 15-16, 2018  
Website: <http://nmf2018.usacm.org>  
Total Award: \$5,000



**U.S. Department of Defense** 2016-2017

*Defense Advanced Research Projects Agency (DARPA)*

Title: Foundations of rigorous mathematics for uncertainty quantification of large multiscale systems at the extreme scale

Role: Senior Investigator

Total Award: \$2,000,000

PI: Clayton Webster (Oak Ridge National Laboratory)

Co-PIs: W. Dahmen (RWTH Aachen), R. DeVore (Texas A&M), Q. Du (Columbia University), M. Gunzburger (Florida State University), and N. Zabaras (University of Warwick)

**Oak Ridge National Laboratory** 2016-2017

*Laboratory Directed Research & Development (LDRD)*

Title: Novel numerical methods for uncertainty quantification of multiscale materials

Role: Co-Principal Investigator

Total Award: \$722,000

PI: Clayton Webster (Oak Ridge National Laboratory)

Other Co-PIs: G. Fann, M. Stoyanov, and G. Zhang (ORNL)

**Oak Ridge National Laboratory** 2015-2017

*Laboratory Directed Research & Development (LDRD)*

Title: Concurrent multiscale algorithms for local/nonlocal coupling and its adaptivity

Role: Principal Investigator

Total Award: \$577,200

**U.S. Department of Energy** 2015-2017

*Advanced Scientific Computing Research (ASCR)*

Title: Householder fellowship

Role: Principal Investigator

Total Award: \$300,000

**USNC/TAM AmeriMech Symposia** 2015

Workshop: Nonlocal Models in Mathematics, Computation, Science, and Engineering

Location: Oak Ridge, TN, USA

Dates: October 26-28, 2015

Website: <http://nlmcse.usacm.org/>

Total Award: \$4,000

**Sandia National Laboratories** 2012-2014

*Laboratory Directed Research & Development (LDRD)*

Title: Strong local-nonlocal coupling for integrated fracture modeling

Role: Co-Principal Investigator

Award: \$165,000 for UT Austin

PI: David Littlewood (Sandia National Laboratories)

OTHER PROJECTS CONTRIBUTION

**U.S. Department of Energy** 2017-2022

*Scientific Discovery through Advanced Computing (SciDAC)*

Title: Plasma Surface Interactions: Predicting the Performance and Impact of Dynamic PFC Surfaces

Role: Senior Investigator

PI: Brian Wirth (University of Tennessee, Knoxville)

ORNL PI: David Bernholdt

Funding: \$650,000 (5 years) for Pablo Seleson

#### FACULTY HOST

##### **Walter Gerstle**

I hosted Walter Gerstle during his participation in the HBCU/MEI Faculty Summer Research Program at ORNL in the summer of 2019. At that time, Walter was a Professor Emeritus in the Department of Civil Engineering at the University of New Mexico.

#### POSTDOC ADVISOR

##### **Marco Pasetto**

Marco Pasetto joined the Computational and Applied Mathematics group at ORNL as a Postdoctoral Research Associate in the fall of 2019.

##### **Jeremy Trageser**

Jeremy Trageser joined the Computational and Applied Mathematics group at ORNL as a Postdoctoral Research Associate in the summer of 2017. I was his postdoc advisor until the end of his postdoc appointment in the summer of 2019, when he joined Sandia National Laboratories.

#### STUDENT MENTOR AND SUPERVISOR

##### **Martin Scott Driggers**

I mentored Martin Scott Driggers during his participation in the SULI program in the summer of 2020. At that time, Scott was an undergraduate mathematics and physics majors at Clemson University.

##### **Debdeep Bhattacharya**

I supervised Debdeep Bhattacharya during his participation in the NSF Mathematical Sciences Graduate Internship (MSGI) Program at ORNL in the summer of 2019. At that time, Debdeep was a Ph.D. student in the Department of Mathematics at George Washington University.

##### **Biraj Dahal**

I mentored Biraj Dahal during his participation in the SULI program in the summer of 2019 and spring of 2020. Biraj completed an undergraduate dual degree program in computer science and mathematical sciences at Clemson University in the fall of 2019. As a result of his internship work, Biraj was selected as an ORISE IGNITE winner at ORNL in the spring of 2020 for his presentation on Complex Network Analysis.

##### **Marco Pasetto**

I supervised Marco Pasetto during his participation in the Advanced Short-Term Research Opportunity (ASTRO) Program at ORNL in the summer of 2018 and summer of 2019. At that time, Marco was a Ph.D. student in the Department of Structural Engineering at the University of California, San Diego.

**Mary Vaughan**

I supervised Mary Vaughan during her participation in the NSF Mathematical Sciences Graduate Internship (MSGI) Program at ORNL in the summer of 2018. At that time, Mary was a Ph.D. student in the Department of Mathematics at Iowa State University.

**Kylie Berry**

I supervised Kylie Berry during her participation in the DOE Office of Science Graduate Student Research (SCGSR) Program at ORNL in the spring/summer of 2018. At that time, Kylie was a Ph.D. student in the Department of Mathematics at the University of Tennessee, Knoxville.

**Kelsey Wells**

I supervised Kelsey Wells during her participation in the NSF Mathematical Sciences Graduate Internship (MSGI) Program at ORNL in the summer of 2017. At that time, Kelsey was a Ph.D. student in the Department of Mathematics at the University of Nebraska–Lincoln.

**Mae Markowski**

I mentored Mae Markowski during her participation in the SULI program at ORNL in the summer of 2017. At that time, Mae was an undergraduate mathematics major at George Mason University.

**Jeremy Trageser**

I co-supervised Jeremy Trageser during his summer internship at ORNL in the summer of 2016. At that time, Jeremy was a Postdoctoral Scientist in the Department of Mathematics at George Washington University.

**Yunzhe Tao**

I co-supervised Yunzhe Tao during his summer internship at ORNL in the summer of 2016. At that time, Yunzhe was a Ph.D. student in the Department of Applied Physics and Applied Mathematics at Columbia University.

**Xiaochuan Tian**

I co-supervised Xiaochuan Tian during her summer internship at ORNL in the summer of 2016. At that time, Xiaochuan was a Ph.D. student in the Department of Applied Physics and Applied Mathematics at Columbia University.

**Túlio Patriota**

I mentored Túlio Patriota during an internship at ORNL in the summer of 2016 and in the spring of 2017. At that time, Túlio was an undergraduate mechanical engineering major at the University of São Paulo in Brazil.

**Konrad Genser**

I mentored Konrad Genser during his participation in the SULI program at ORNL in the summer of 2015. At that time, Konrad was an undergraduate physics major at the University of Illinois at Urbana-Champaign.

### **Yohan John**

I mentored Yohan John during his participation in the SULI program in the summer of 2015. At that time, Yohan was an undergraduate mechanical engineering major at the Georgia Institute of Technology. As a result of his internship work, Yohan received a “Best Poster Award” in the 2015 Summer Student Poster Session at ORNL.

### **Timo van Opstal**

I co-supervised Timo van Opstal during his internship at ICES in the summer/fall of 2012. At that time, Timo was a Ph.D. student in the Department of Mechanical Engineering at the Eindhoven University of Technology in the Netherlands.

### **Eric Wright**

I co-supervised Eric Wright in 2010-2012 in his graduate research, while he was a Ph.D. student in the CSEM program in ICES at The University of Texas at Austin.

### **Kathryn Farrell**

I co-supervised Kathryn Farrell in 2010-2012 in her graduate research, while she was a Ph.D. student in the CSEM program in ICES at The University of Texas at Austin.

### **Samir Beneddine**

I co-supervised Samir Beneddine during his internship at ICES in the summer of 2011. At that time, Samir was a Master’s student in the Department of Mechanical Engineering at the École Normale Supérieure de Cachan in France.

## PROFESSIONAL SOCIETY MEMBERSHIPS

- Society for Industrial and Applied Mathematics (SIAM)
- United States Association for Computational Mechanics (USACM)
- International Association for Computational Mechanics (IACM)
- Engineering Mechanics Institute (EMI) of American Society of Civil Engineers (ASCE)

## PROFESSIONAL SERVICE ACTIVITIES

- **Short-Course Instructor**

### 2019:

- *Peridynamic Theory of Solid Mechanics: Modeling, Computation, and Applications*  
15th U.S. National Congress on Computational Mechanics  
Co-taught with John Foster (University of Texas at Austin) and David Littlewood (Sandia National Laboratories).

### 2018:

- *Peridynamic Theory of Solid Mechanics: Modeling, Computation, and Applications*  
13th World Congress on Computational Mechanics  
Co-taught with John Foster (University of Texas at Austin) and David Littlewood (Sandia National Laboratories).
- *Peridynamic Theory of Solid Mechanics: Modeling, Computation, and Applications*  
18th U.S. National Congress for Theoretical and Applied Mechanics  
Co-taught with John Foster (University of Texas at Austin) and David Littlewood (Sandia National Laboratories).

2017:

- *Peridynamic Theory of Solid Mechanics: Modeling, Computation, and Applications*  
14th U.S. National Congress on Computational Mechanics  
Co-taught with John Foster (University of Texas at Austin) and David Littlewood (Sandia National Laboratories).

o **Minisymposium Co-organizer**

2021:

- *Recent Advances in Meshfree, Particle, and Peridynamics Methods*  
XVI International Conference on Computational Plasticity. Fundamentals and Applications  
Co-organized with J.S. Chen (University of California San Diego), John Foster (University of Texas at Austin), and Michael Hillman (Pennsylvania State University).
- *Local-to-Nonlocal and Nonlocal-to-Nonlocal Coupling Methods: Advances in Coupling Techniques and Treatment of Interfaces in Nonlocal Mechanics and Diffusion*  
16th U.S. National Congress on Computational Mechanics  
Co-organized with Marta D’Elia (Sandia National Laboratories).
- *Peridynamic Theory and Multiscale Methods for Complex Material Behavior*  
16th U.S. National Congress on Computational Mechanics  
Co-organized with Patrick Diehl (Louisiana State University), Fei Han (Dalian University of Technology), Gilles Lubineau (KAUST), and Erkan Oterkus (University of Strathclyde).
- *Nonlocal Models in Computational Science and Engineering*  
SIAM Conference on Computational Science and Engineering  
Co-organized with Marta D’Elia (Sandia National Laboratories) and Yue Yu (Lehigh University).
- *Peridynamic Theory and Multiscale Methods for Complex Material Behavior*  
14th World Congress on Computational Mechanics – 8th European Congress on Computational Methods in Applied Sciences and Engineering  
Co-organized with Patrick Diehl (Louisiana State University), Fei Han (Dalian University of Technology), Gilles Lubineau (KAUST), and Erkan Oterkus (University of Strathclyde).
- *Nonlocal Models in Computational Mechanics: Challenges and Applications*  
14th World Congress on Computational Mechanics – 8th European Congress on Computational Methods in Applied Sciences and Engineering  
Co-organized with Marta D’Elia (Sandia National Laboratories), Ugo Galvanetto (University of Padova), and Mirco Zaccariotto (University of Padova).

2020:

- *Peridynamic Modeling of Materials’ Behavior*  
ASME 2020 International Mechanical Engineering Congress & Exposition  
Co-organized with Florin Bobaru (U. Nebraska-Lincoln), John Foster (UT Austin), Ibrahim Guven (Virginia Commonwealth University), Erdogan Madenci (U. Arizona), and Stewart Silling (Sandia National Laboratories).

- *Meshfree, Peridynamic, and Particle Methods: Contemporary Methods and Applications*  
Engineering Mechanics Institute Conference – Probabilistic Mechanics & Reliability Conference (conference postponed)  
Co-organized with J.S. Chen (UC San Diego), Sheng-Wei Chi (U. Illinois at Chicago), Mike Hillman (Penn State), and John Foster (UT Austin).
- *Recent Developments in Nonlocal Continuum Modeling*  
44th SIAM Southeastern Atlantic Section Conference (conference postponed)  
Co-organized with James Scott (University of Tennessee Knoxville).

2019:

- *Peridynamic Modeling of Materials' Behavior*  
ASME 2019 International Mechanical Engineering Congress & Exposition  
Co-organized with Florin Bobaru (U. Nebraska-Lincoln), John Foster (UT Austin), Ibrahim Guven (Virginia Commonwealth University), Erdogan Madenci (U. Arizona), and Stewart Silling (Sandia National Laboratories).
- *Analysis and Applications of Fractional PDEs and Nonlocal Operators*  
43rd Annual Meeting of the SIAM Southeastern Atlantic Section  
Co-organized with Tadele Mengesha (University of Tennessee Knoxville) and Mitchell Sutton (University of Tennessee Knoxville).
- *Meshfree, Particle, and Peridynamic Methods*  
XV International Conference on Computational Plasticity. Fundamentals and Applications  
Co-organized with J.S. Chen (University of California San Diego) and Mike Hillman (Pennsylvania State University).
- *Local-Nonlocal Coupling Methods for Nonlocal Models*  
15th U.S. National Congress on Computational Mechanics  
Co-organized with Marta D'Elia (Sandia National Laboratories).
- *Nonlocal Modeling, Analysis, and Computation*  
International Congress on Industrial and Applied Mathematics  
Co-organized with Qiang Du (Columbia University) and Robert Lipton (Louisiana State University).
- *Meshfree, Peridynamics, and Particle Methods: Contemporary Methods and Applications*  
Engineering Mechanics Institute Conference 2019  
Co-organized with J.S. Chen (UC San Diego), Sheng-Wei Chi (U. Illinois at Chicago), Mike Hillman (Penn State), and John Foster (UT Austin).
- *Nonlocal Models in Computational Science and Engineering*  
SIAM Conference on Computational Science and Engineering  
Co-organized with Marta D'Elia (Sandia National Laboratories) and Yue Yu (Lehigh University).

2018:

- *Peridynamic Modeling of Materials' Behavior*  
ASME 2018 International Mechanical Engineering Congress & Exposition  
Co-organized with Florin Bobaru (U. Nebraska-Lincoln), John Foster (UT Austin), Ibrahim Guven (Virginia Commonwealth University), Erdogan Madenci (U. Arizona), and Stewart Silling (Sandia National Laboratories).

- *Multi-Scale*  
USACM Thematic Conference on Meshfree and Particle Methods: Applications and Theory  
Co-organized with Armando Duarte (U. Illinois at Urbana-Champaign) and Julia Plews (Sandia National Laboratories).
- *Local-Nonlocal Coupling Methods for Nonlocal Models*  
13th World Congress on Computational Mechanics  
Co-organized with Marta D’Elia (Sandia National Laboratories).
- *Peridynamics and Its Applications*  
13th World Congress on Computational Mechanics  
Co-organized with Erdogan Madenci (U. Arizona), Erkan Oterkus (U. Strathclyde), Florin Bobaru (U. Nebraska–Lincoln), and John Foster (UT Austin).
- *Nonlocal Models and Methods for Material Failure and Damage Simulation*  
6th European Conference on Computational Mechanics – 7th European Conference on Computational Fluid Dynamics  
Co-organized with Adair Aguiar (U. São Paulo), Mahmoud Mousavi (Karlstad University), and Erkan Oterkus (U. Strathclyde).
- *Peridynamics – Modeling, Theory, and Applications*  
18th U.S. National Congress for Theoretical and Applied Mechanics  
Co-organized with Florin Bobaru (U. Nebraska–Lincoln), John Foster (UT Austin), Erdogan Madenci (U. Arizona), Jianxiang Wang (Peking University), and Qing Zhang (Hohai University).
- *Meshfree, Peridynamics, and Particle Methods: Contemporary Methods and Applications*  
Engineering Mechanics Institute Conference 2018  
Co-organized with J.S. Chen (UC San Diego), Sheng-Wei Chi (U. Illinois at Chicago), Michael Hillman (Penn State), John Foster (UT Austin), and Dongdong Wang (Xiamen University).

2017:

- *Nonlocal Models in Computational Science and Engineering*  
SIAM Conference on Computational Science and Engineering  
Co-organized with Marta D’Elia (Sandia National Laboratories) and Qiang Du (Columbia).

2016:

- *Nonlocal Theories and Multiscale Methods for Complex Material Behavior*  
12th World Congress on Computational Mechanics – 6th Asia-Pacific Congress on Computational Mechanics  
Co-organized with Youn Doh Ha (Kunsan National University), Fei Han (KAUST), David Littlewood (Sandia National Laboratories), and Gilles Lubineau (KAUST).

2015:

- *Nonlocal Models for Mechanics and Diffusion*  
First Pan-American Congress on Computational Mechanics  
Co-organized with Diego Del-Castillo-Negrete (Oak Ridge National Laboratory) and Michael Parks (Sandia National Laboratories).

- *Mathematical and Computational Methods for Coupling Local and Nonlocal Models*  
8th International Congress on Industrial and Applied Mathematics  
Co-organized with Marta D’Elia (Sandia National Laboratories) and Pavel Bochev (Sandia National Laboratories).

2013:

- *Multiscale Methods and Nonlocal Theories for Complex Material Behavior*  
12th US National Congress on Computational Mechanics  
Co-organized with Florin Bobaru (U. Nebraska–Lincoln) and John Foster (UT San Antonio).
- *Mathematical and Computational Aspects of Peridynamics and Related Nonlocal Models*  
SIAM Conference on Mathematical Aspects of Materials Science  
Co-organized with Qiang Du (Penn State) and Michael Parks (Sandia National Laboratories).

2012:

- *Nonlocal Models: Analytical, Numerical, Uncertainty Quantification, and High-Performance Computing Methods*  
10th World Congress on Computational Mechanics  
Co-organized with Florin Bobaru (U. Nebraska–Lincoln) and Ernesto Prudencio (UT Austin).
- *Mathematical and Computational Analysis of Concurrent Methods for Multiscale Material Modeling*  
10th World Congress on Computational Mechanics  
Co-organized with Michael Parks (Sandia National Laboratories) and Serge Prudhomme (UT Austin).

2011:

- *Mathematical Modeling and Analysis for Multiscale Materials*  
11th US National Congress on Computational Mechanics  
Co-organized with Mitchell Luskin (U. Minnesota), Michael Parks (Sandia National Laboratories), and Serge Prudhomme (UT Austin).

o **Workshop Co-organizer**

2021:

- *One Nonlocal World, Opening Event, January 22-23, 2021, Virtual Meeting*  
Co-organized with Marta D’Elia (Sandia National Laboratories), Qiang Du (Columbia University), Petronela Radu (University of Nebraska-Lincoln), Xiaochuan Tian (University of California San Diego), and Yue Yu (Lehigh University)

2020:

- *Experimental and Computational Fracture Mechanics: Validating peridynamics and phase field models for fracture prediction and experimental design, February 26-28, 2020, Baton Rouge, LA, USA*  
Co-organized with Patrick Diehl (Louisiana State University) and Serge Prudhomme (Polytechnique Montréal)



- Workshop sponsored by USACM, LSU CCT, ORNL, SES, and USNCTAM.
- Partial support provided by ORNL and USNCTAM (AmeriMech).

2019:

- *The Future of Uncertainty Quantification and Multiscale Modeling Across the Department of Energy* (2<sup>nd</sup> Applied Math Visioning Workshop), September 17-18, 2019, Albuquerque, NM, USA  
Co-organized with David Barajas-Solano (Pacific Northwest National Laboratory), Aydin Buluç (Lawrence Berkeley National Laboratory), Emil Constantinescu (Argonne National Laboratory), Meifeng Lin (Brookhaven National Laboratory), Kara Peterson (Sandia National Laboratories), Gowri Srinivasan (Los Alamos National Laboratory), and Jayaraman Thiagarajan (Lawrence Livermore National Laboratory).
  - Workshop organized with the help and guidance of the Computational Research Leadership Council (CRLC) from eight national laboratories.
- *The Future of Machine Learning and Data Analytics Across the Department of Energy* (1<sup>st</sup> Applied Math Visioning Workshop), Lawrence Berkeley National Laboratory, April 2-3, 2019, Berkeley, CA, USA  
Co-organized with David Barajas-Solano (Pacific Northwest National Laboratory), Aydin Buluç (Lawrence Berkeley National Laboratory), Emil Constantinescu (Argonne National Laboratory), Meifeng Lin (Brookhaven National Laboratory), Kara Peterson (Sandia National Laboratories), Gowri Srinivasan (Los Alamos National Laboratory), Jayaraman Thiagarajan (Lawrence Livermore National Laboratory), and Xiu Yang (Pacific Northwest National Laboratory).
  - Workshop organized with the help and guidance of the Computational Research Leadership Council (CRLC) from eight national laboratories.

2018:

- *Nonlocal Methods in Fracture*, January 15-16, 2018, Austin, TX, USA  
Co-organized with Michael Borden (Brigham Young University), John Foster (UT Austin), Chad Landis (UT Austin), Rob Lipton (Louisiana State University), Erdogan Madenci (U. Arizona), and Stewart Silling (Sandia National Laboratories).
  - Workshop organized through the USACM.
  - Partial support provided by ORNL.

2015:

- *Nonlocal Models in Mathematics, Computation, Science, and Engineering*, October 26-28, 2015, Oak Ridge, TN, USA  
Co-organized with Tadele Mengesha (University of Tennessee, Knoxville), Michael Parks (Sandia National Laboratories), and Clayton Webster (Oak Ridge National Laboratory).
  - Workshop organized through the USACM in cooperation with SIAM.
  - Partial support provided by DOE, NSF, Sandia, and USNCTAM (AmeriMech).

o **Seminar Series Organizer**

2019–2020:

- ORNL Computational Mechanics Seminar (monthly).

2015:

- ORNL Computational and Applied Mathematics Seminar (weekly).

2010-2012:

- IPAM MD2012 Seminar Series (weekly), Fall 2012  
IPAM Program on Materials Defects  
University of California, Los Angeles, Los Angeles, CA  
Co-organized with Nina Lane (Drexel University).
- Multiscale Modeling Seminar (weekly), 09/2010–05/2012  
Institute for Computational Engineering and Sciences  
The University of Texas at Austin, Austin, TX.

○ **Editorial Board Member**

- Journal of Peridynamics and Nonlocal Modeling

○ **Reviewer**

Ongoing

Journals

- Acta Mechanica
- AIMS Mathematics
- Applied Mathematical Modelling
- Applied Mathematics and Computation
- Archive of Applied Mechanics
- Computational Materials Science
- Computational Mechanics
- Computational Methods in Applied Mathematics
- Computational Particle Mechanics
- Computer Methods in Applied Mechanics and Engineering
- Computers and Mathematics with Applications
- Computers and Structures
- Engineering Computations
- Engineering Fracture Mechanics
- International Journal for Numerical Methods in Engineering
- International Journal of Computer Mathematics
- International Journal of Solids and Structures
- Journal of Computational Physics
- Journal of Elasticity
- Journal of Engineering Mechanics
- Journal of Materials Research
- Journal of Mechanics of Materials and Structures
- Journal of Peridynamics and Nonlocal Modeling
- Journal of Physical Chemistry

- Journal of Scientific Computing
- Journal of the Brazilian Society of Mechanical Sciences and Engineering
- Materials
- Mathematical Models and Methods in Applied Sciences
- Mathematical Reviews
- Mathematics and Mechanics of Solids
- Mechanics Research Communications
- Modelling and Simulation in Materials Science and Engineering
- Molecular Simulation
- New Journal of Physics
- Multiscale Modeling and Simulation
- Numerical Functional Analysis and Optimization
- Numerische Mathematik
- Polish Maritime Research
- Proceedings of the Royal Society A
- Reports on Mathematical Physics
- Rocky Mountain Journal of Mathematics
- SIAM Journal on Applied Mathematics
- SIAM Journal on Numerical Analysis

#### Agencies and Programs

- Advanced Scientific Computing Research (ASCR) program  
U.S. Department of Energy
- Air Force Office of Scientific Research
- Army Research Office
- Czech Science Foundation
- Laboratory Directed Research & Development (LDRD) program  
Oak Ridge National Laboratory
- Nuclear Energy University Program  
U.S. Department of Energy
- Swiss National Supercomputing Centre

#### Faculty Tenure and Promotion

- University of North Carolina at Charlotte, Department of Mathematics and Statistics

#### Ph.D. Thesis

- University of Padova, Department of Industrial Engineering

#### ○ **Committee member**

- Panel interviews for Section Head and Group Leader positions – 2020  
Mathematics in Computation Section  
Computer Science and Mathematics Division, Oak Ridge National Laboratory

- Scientific Committee  
XVI International Conference on Computational Plasticity. Fundamentals and Applications, September 7-10, 2021, Barcelona, Spain
- Technical Program Committee  
16th U.S. National Congress on Computational Mechanics, July 25-29, 2021, Chicago, IL, USA
- Ph.D. Committee – 2019
  1. Kileen Berry, Department of Mathematics, University of Tennessee, Knoxville  
Advisors: Tadele Mengesha and Steven Wise
  2. James Scott, Department of Mathematics, University of Tennessee, Knoxville  
Advisor: Tadele Mengesha
- ORNL Initiative Review Committee – 2019  
Computer Science and Math for Extreme Scale Computing Initiative  
Oak Ridge National Laboratory
- DOE Applied Math Visioning Committee – 2018–2019.
- Organizing Committee  
Workshop on Machine Learning for Computational Fluid and Solid Dynamics, February 19-21, 2019, Santa Fe, NM, USA
- Scientific Committee  
USACM Thematic Conference on Meshfree and Particle Methods: Applications and Theory, September 10-12, 2018, Santa Fe, NM, USA
- CSMD Interview/Search Committee – 2017–2019  
Computer Science and Mathematics Division, Oak Ridge National Laboratory
- Computations Organizing Committee  
18th U.S. National Congress for Theoretical and Applied Mechanics, 2018
- Householder Fellowship Committee – 2015–2016  
Computational & Applied Mathematics Group, Oak Ridge National Laboratory
- Multi-scale modeler hire – 2016  
Geochemistry & Interfacial Sciences Group, Oak Ridge National Laboratory
- **Poster Judge**
  - LDRD Poster Session, October 4, 2017  
Laboratory Directed Research & Development (LDRD) program, ORNL
  - Annual Student Poster Night, October 26, 2018  
Oak Ridge Chapter of the American Society for Metals (ASM) and the Southeast Section of AACG (American Association for Crystal Growth)
- **Panelist**
  - Early Career Preparation Workshop, November 28, 2018  
Computer Science and Mathematics Division  
Oak Ridge National Laboratory
  - Quality Enhancement Review Panel, September 30, 2019  
Department of Scientific Computing  
Florida State University

#### SUMMER SCHOOLS AND LONG-TERM PROGRAMS

- IPAM Program on Materials Defects: Mathematics, Computation, and Engineering, UCLA, Los Angeles, California, USA, September 10 - December 14, 2012.
- SAMSI/Sandia Summer School on Uncertainty Quantification, Albuquerque, New Mexico, USA, June 20 - 24, 2011.
- 2007 DOE Summer School in Multiscale Mathematics and High Performance Computing, Oregon State University, Corvallis, Oregon, USA, June 29 - July 3, 2007.

#### COMPUTER PROFICIENCIES

- Programming languages: Fortran 77, Fortran 90, C++, Java, MPI, Matlab
- Operating systems: Microsoft Windows, Mac OS X, Unix, Linux
- Additional software: Latex, HTML, SVN, Mathematica, MathCad, LAMMPS, LabView, Supermongo, Microsoft Office