

CURRICULUM VITAE

PABLO SELESON

CONTACT INFORMATION

Oak Ridge National Laboratory
One Bethel Valley Road
P.O. Box 2008, MS 6211
Oak Ridge, TN 37831, USA

Email: selesonpd@ornl.gov
Phone: (+1) 865-576-2856
Fax: (+1) 865-241-0381
www.ornl.gov/~psc

RESEARCH INTERESTS

- Concurrent multiscale modeling, atomistic-to-continuum coupling
- Mathematical and computational analysis of peridynamics and related nonlocal models
- Phase-field methods and model adaptivity
- Coarse-graining in molecular dynamics
- Uncertainty quantification and statistical methods, Bayesian inference

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** 08/2016-present
*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

- Member of the Technical Thrust Area: “Large Scale Structural Systems and Optimal Design” 2015-2017
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. **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.
2. **Pablo Seleson** and David J. Littlewood, “*Convergence Studies in Meshfree Peridynamic Simulations*”, *Computers and Mathematics with Applications*, 71(11), pp. 2432-2448, 2016.
3. 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.
4. **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.
5. **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.
6. **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.
7. **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.
8. **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.
9. **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.
10. **Pablo Seleson** and Max Gunzburger, “*Bridging Methods for AtC Coupling and Their Implementation*”, *Communications in Computational Physics*, 7, pp. 831-876, 2010.
11. **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 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.
2. 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. 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.
2. **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.
3. **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 (editors), Sandia National Laboratories, 2008, pp. 177-184. Available as Sandia National Laboratories Technical Report SAND2008-8257P.
4. 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. **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, edited by Anter El- Azab, pp. 77-80, October 2008, Tallahassee, FL.

PRESENTATIONS IN CONFERENCES AND WORKSHOPS

1. “*Surface effect analysis and correction in peridynamics*”, invited talk, ASME 2016 International Mechanical Engineering Congress & Exposition, November 11-17, 2016, Phoenix, AZ, USA.
2. “*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.
3. “*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.

4. “*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.
5. “*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.
6. “*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.
7. “*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.
8. “*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.
9. “*Peridynamic models for upscaling crystalline structures*”, contributed talk, SIAM Conference on Mathematical Aspects of Materials Science, May 8-12, 2016, Philadelphia, PA, USA.
10. “*Uncertainty inclusion and characterization in nonlocal theories for materials modeling*”, invited talk, SIAM Conference on Uncertainty Quantification, April 5-8, 2016, Lausanne, Switzerland.
11. “*Toward uncertainty quantification in multiscale materials simulations*”, invited talk, DARPA Open Manufacturing Review Meeting, February 16-18, 2016, Arlington, VA, USA.
12. “*Multiscale coupling methods in peridynamics*”, invited talk, Fifth Chilean Workshop on Numerical Analysis of Partial Differential Equations, January 11-15, 2016, Concepción, Chile.
13. “*Towards multiscale material modeling with peridynamics*” (Skype presentation), invited talk, Current Trends in Non-Classical Continuum Mechanics, December 14-15, 2015, Goa, India.
14. “*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.
15. “*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.
16. “*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.
17. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, Advances in Scientific Computing and Applied Mathematics, October 9-12, 2015, Las Vegas, NV, USA.
18. “*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.

19. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, The 8th International Congress on Industrial and Applied Mathematics, August 10-14, 2015, Beijing, China.
20. “*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.
21. “*Convergence studies of meshfree peridynamic simulations*”, invited talk, 13th U.S. National Congress on Computational Mechanics, July 26-30, 2015, San Diego, CA, USA.
22. “*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.
23. “*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.
24. “*A concurrent multiscale blending scheme for local/nonlocal coupling*”, invited talk, AMS Spring Southeastern Sectional Meeting, March 27-29, 2015, Huntsville, AL, USA.
25. “*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.
26. “*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.
27. “*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.
28. “*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.
29. “*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.
30. “*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.
31. “*Mathematical modeling and analysis of interface problems for nonlocal diffusion*”, invited talk, 2013 Joint Mathematics Meetings, January 9-12, 2013, San Diego, CA, USA.
32. “*Concurrent multiscale modeling in peridynamics*”, invited talk, ASME 2012 International Mechanical Engineering Congress and Exposition, November 9-12, 2012, Houston, TX, USA.
33. “*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.

34. “A force-based blending between peridynamics and classical elasticity”, invited talk, 10th World Congress on Computational Mechanics, July 8-13, 2012, São Paulo, Brazil.
35. “Multiscale modeling approaches in peridynamics”, invited talk, 10th World Congress on Computational Mechanics, July 8-13, 2012, São Paulo, Brazil.
36. “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.
37. “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.
38. “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.
39. “Peridynamics as a multiscale material model”, invited talk, 2011 AMS Fall Central Section Meeting, October 14-16, 2011, Lincoln, Nebraska, USA.
40. “Interface problems in nonlocal multiscale modeling”, invited talk, 11th US National Congress on Computational Mechanics, July 25-29, 2011, Minneapolis, Minnesota, USA.
41. “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.
42. “Multiscale modeling in peridynamic solid mechanics”, contributed talk, Workshop on Macroscopic Modeling of Materials with Fine Structure, May 26-28, 2011, Pittsburgh, Pennsylvania, USA.
43. “Connecting peridynamic models and coupling local and nonlocal systems”, invited talk, Mini-Workshop: Mathematical Analysis for Peridynamics, January 16-22, 2011, Oberwolfach-Walke, Germany.
44. “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.
45. “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.
46. “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.
47. “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.
48. “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. “*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.
2. “*Toward multiscale material modeling with peridynamics*”, Mechanical Engineering Seminar, April 18, 2016, Department of Mechanical Engineering, Technion–Israel Institute of Technology, Haifa, Israel.
3. “*Toward multiscale material modeling with peridynamics*”, Numerical Analysis Seminar, March 1, 2016, Department of Mathematics, University of Maryland, College Park, MD, USA.
4. “*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.
5. “*Multiscale material modeling with mesoscopic models*”, Colloquium, February 5, 2014, Department of Computational and Applied Mathematics, Rice University, Houston, TX, USA.
6. “*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.
7. “*Multiscale material modeling with mesoscopic models*”, Colloquium, January 17, 2014, Department of Mathematics, Statistics and Computer Science, Marquette University, Milwaukee, WI, USA.
8. “*Bridging scales in materials with mesoscopic models*”, Computer Science and Mathematics Division Seminar, January 13, 2014, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
9. “*Multiscale material modeling with mesoscopic models*”, Mathematics Colloquium, December 3, 2013, Department of Mathematics, Kansas State University, Manhattan, KS, USA.
10. “*Multiscale material modeling with mesoscopic models*”, Collaboratory on Mathematics for Mesoscopic Modeling of Materials Webinar, Pacific Northwest National Laboratory, September 9, 2013.
11. “*Multiscale material modeling with peridynamics*”, Computer Science and Mathematics Division Seminar, May 31, 2013, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
12. “*Multiscale material modeling with peridynamics*”, Mathematics Colloquium, January 24, 2013, Department of Mathematics, University of Tennessee, Knoxville, TN, USA.
13. “*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.
14. “*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.
15. “*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.

16. “*Scientific research from a computational science perspective*”, Math Club, September 27, 2012, Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE, USA.
17. “*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.
18. “*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.
19. “*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.
20. “*Peridynamics as a multiscale material model*”, Multiscale Modeling & Analysis Course, April 12, 2012, Mathematics Department, The Pennsylvania State University, State College, PA, USA.
21. “*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.
22. “*Introduction to software versioning, SVN & CVS*”, SCS technical topics series, October 10, 2007, School of Computational Science, Florida State University, Tallahassee, Florida, USA.
23. “*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. “*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.
2. “*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.
3. “*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.
4. “*Peridynamics as a multiscale material model*”, 2011 DOE Applied Mathematics Program Meeting, October 17-19, 2011, Reston, Virginia, USA.
5. “*Interface problems in nonlocal multiscale modeling*”, 11th US National Congress on Computational Mechanics, July 25-29, 2011, Minneapolis, Minnesota, USA.
6. “*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.
7. “*Peridynamics as an upscaling of molecular dynamics*”, Computational Exposition 2009, April 14, 2009, Department of Scientific Computing, Florida State University, Tallahassee, Florida, USA.

8. “*Bridging methods and boundary treatment for AtC coupling problems*”, The Fourth International Conference on Multiscale Materials Modeling, October 27-31, 2008, Tallahassee, Florida, USA.
9. “*Peridynamics as an upscaling of molecular dynamics*”, Applied Mathematics Principal Investigators Meeting, October 15-17, 2008, Argonne, Illinois, USA.
10. “*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.
11. “*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.
12. “*The buildup of galaxies in dark-matter halos*”, Nearly Normal Galaxies in a Λ CDM Universe conference, August 8-12, 2005, Santa Cruz, California, USA.

CONTRACTS AND GRANTS

- Department of Defense** 2016-2019
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: \$3,500,000
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** 2016-2018
Laboratory Directed Research & Development (LDRD)
Title: Novel numerical methods for uncertainty quantification of multiscale materials
Role: Co-Principal Investigator
Total Award: \$850,000
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: \$540,000
- Department of Energy** 2015-2017
Advanced Scientific Computing Research (ASCR)
Title: Householder fellowship
Role: Principal Investigator
Total Award: \$300,000

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)

STUDENTS AND POSTDOCS

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 his summer internship at ORNL in the summer of 2016. 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)

PROFESSIONAL SERVICE ACTIVITIES

- **Minisymposium Co-organizer**

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 University).

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).

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).

- **Workshop Co-organizer** 2015
 - *Nonlocal Models in Mathematics, Computation, Science, and Engineering*
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 National Laboratories, and USNCTAM (AmeriMech).
- **CAM Seminar Series Organizer** 2015
 - Organize weekly seminars for the Computational and Applied Mathematics (CAM) Group at ORNL.
- **IPAM MD2012 Seminar Series Co-organizer** Fall 2012
 - Organized weekly presentations of junior participants at the IPAM Program on Materials Defects at UCLA, Los Angeles, CA.
Co-organizer: Nina Lane (Drexel University).
- **Multiscale Modeling Meeting Organizer** 09/2010-05/2012
 - Organized a weekly seminar for the Multiscale Modeling Group at ICES.
- **Reviewer** Ongoing

Journals

- Applied Mathematics and Computation
- Computational Materials Science
- Computational Mechanics
- Computer Methods in Applied Mechanics and Engineering
- Computers and Mathematics with Applications
- International Journal for Numerical Methods in Engineering

- International Journal of Computer Mathematics
- Journal of Computational Physics
- Journal of Elasticity
- Mechanics Research Communications
- Multiscale Modeling and Simulation
- Numerical Functional Analysis and Optimization
- Proceedings of the Royal Society A
- Reports on Mathematical Physics
- SIAM Journal on Applied Mathematics
- SIAM Journal on Numerical Analysis

Agencies

- Air Force Office of Scientific Research
 - Swiss National Supercomputing Centre
 - Czech Science Foundation
- **Committee member**
 - Householder Fellowship – 2015, 2016
Computational & Applied Mathematics Group, ORNL
 - Multi-scale modeler hire – 2016
Geochemistry & Interfacial Sciences Group, ORNL

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