Curriculum Vitae

Robert P. Lipton

Nicholson Professor

Affiliation

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Education

Ph.D. Mathematics, NYU, Courant Institute of Mathematical Sciences, 1986.

M.S. Mathematics, NYU, Courant Institute of Mathematical Sciences, 1984.

B.S. Electrical Engineering, University of Colorado, 1981.

Professional Experience

Fall 2018 - present Nicholson Professor, Department of Mathematics, Louisiana State University.

2007- Fall 2018 S. B. Barton Professor, Department of Mathematics, Louisiana State University.

2010-present Adjunct Faculty, Center for Computation and Technology

August 2001-present Professor, Department of Mathematics, Louisiana State University.

July 1999-July 2001 Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute.

1993- July 1999 Associate Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute.

1990-1992 Assistant Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute.

1988-1990 C. B. Morrey Assistant Professor, University of California, Berkeley, Department of Mathematics.

1987-1988 Postdoctoral Associate & Visiting Assistant Professor, Mathematical Sciences Institute, Cornell University.

1986-1987 Postdoctoral Associate, Mathematical Sciences Institute, Cornell University.

1981-1982 VLSI Process Engineer, United Technologies, Colorado Springs, Colorado.

Visiting Professorships-Fellowships

J. T. Oden Faculty Fellowship ICES, University of Texas, Austin, TX: Fall Semester 2017, Spring Semester 2012, December 2010, September 2009, August 2008, April 2007, June 2006, August 2004.

Long Term Visitor Institute for Mathematics and its Applications, University of Minnesota, Spring 2017.

Visiting Professor University of Rome I, La Sapienza, Italy, June 2008.

Visiting Scholar, Division of Engineering and Applied Sciences Harvard University, Fall 2004 and Spring 2005.

Guest Professor Danish Technical University, Lyngby, Denmark, Fall 1996.

Awards and Duties

Editor in Chief: SIAM Journal on Mathematical Analysis, Starting January, 2019

LSU Distinguished Faculty Award 2011

LSU Rainmaker Award 2009

AAAS Fellow 2013

Co-Chair SIAM Mathematical Aspects of Materials Science, Portland OR, 2018

President SIAM Texas-Louisiana Section 2018

Board of Directors, Society of Engineering Science 2008-2013

Vice Chairman SIAM Activity Group on Mathematics of Materials Science 2011-2013

Selection Committee, Society for Natural Philosophy

Member of Committee on Science Policy, American Mathematical Society, 2006-2009

Journal Editor

Editorial Board, SIAM Journal on Mathematical Analysis

Editorial Board, Multiscale Modeling and Simulation, SIAM

Editorial Board, IMA Journal of Applied Mathematics

Editorial Board, Applicable Analysis

Advisory Board, Mathematics and Mechanics of Complex Systems

Professional Organizations

American Association of the Advancement of Science AAAS

Society for Engineering Science SES

American Mathematical Society AMS

Society for Industrial and Applied Mathematics SIAM

Society for Natural Philosophy SNP

Materials Research Society MRS

United States Association for Computational Mechanics USACM

Grant History

1. Principal Investigator, NSF Grant DMS-1813698, July 15, 2018 - June 30, 2021. Title: Structural Spectra and Applications to Heterogeneous Media. Amount $305,531.

2. Principal Investigator, ARO Grant W911NF-16-1-0456, August 2016 - July 2019. Title: Mathematical and Multiscale Foundations of Nonlocal Modeling. Amount $555,543.

3. Principal Investigator (LSU PI), AFOSR MURI, August 2012 - March 2018. Title: Innovative Use of Metamaterials in Confining, Controlling, and Radiating Intense Microwave Sources. Amount $1,025,000 in funding.

4. Principal Investigator, NSF Grant DMS-1211066, August 2012 - January 2017. Title: Extraction of local strain and stress fields inside complex multi-scale composite architectures. Amount $228,000.

5. Principal Investigator, STTR AFOSR Contract FA9550-10-C-0100 May 2010. Title: Multi-scale Physics-Based Models for High Strength Titanium Alloys Accounting for Higher-Order Microstructure Statistics. Amount $99,913.

6. Principal Investigator, NSF Grant DMS-0807265, July 2008 - June 2012. Title: Multi-Scale Analysis of Field Behavior Inside Heterogeneous Media for Local and Nonlocal Continuum Theories. Amount $322,529.

7. Principal Investigator, AFOSR Grant FA9550-08-1-0095, March 2008-November 2010. Title: Analysis of Multi-Scale Phenomena in Heterogeneous Materials. Amount $399,193.

8. Principal Investigator, AFOSR Grant FA9550-05-1-0008, October 2004-November 2007. Title: Multi-Scale Analysis of Heterogeneous Media. Amount $282,481.

9. Principal Investigator, NSF Grant DMS-0406374, August 2004-July 2007. Title: Stress Analysis in Composite Structures. Amount $145,161.

10. Principal Investigator, AFOSR Grant F49620-02-1-0041, January 2002-October 2004. Title: Computational Design of Heterogeneous Structural, Electric and Optical Components. Amount $299,000.

11. Principal Investigator, NSF Grant DMS-0072469, August 2000-July 2002. Title: Optimal Design of Materials, Structures and Devices. Amount $59,000.

12. Principal Investigator, AFOSR Grant F49620-99-1-0009, December 1998-November 2001. Title: Characterization and Design of Electromagnetic, Chemical, and Thermal Transport Processes for Multi-Phase Systems. Amount $52,263.

13. Principal Investigator, NSF Grant DMS-9700638, August 1997-July 2000. Title: Analysis and Characterization of Multi-Phase systems with Application to Optimal Design. Amount $74,100.

14. Principal Investigator, AFOSR Grant F49620-96-1-0055, July 1996-November 1998. Design of Heterogeneous Heat Conducting and Elastic Structures with Imperfect Interface. Amount $50,184.

15. Principal Investigator, NSF Grant DMS-9403866 (Applied Mathematics and Fluid, Hydraulic, and Particulate Systems Programs), July 1994-June 1997. Title: Analysis of Transport Properties for Composites and Multi-Phase Flows with Applications to Optimal Design. Amount $90,000.

16. Principal Investigator, NSF Grant DMS-9205158, July 1992-June 1994. Title: Analysis of Constitutive Relations and Transport Properties of Composites with Applications to Problems of Optimal Structural Design. Amount $47,000.

17. Principal Investigator, NSF Grant DMS-8907658, July, 1988-June 1990. Title: The Overall Elastic Properties of Transversely Isotropic Composites. Amount $28,450.

Industrial Sponsored Research

Principal Investigator, The Boeing Company, Research Contract, October 2006-March 2008. Title: Micro-Peridynamics for Fiber Reinforced Composites. Amount $162,468.

Conference Grants

1. Principal Investigator, NSF Grant DMS-1437609, September 2014 - August 2015. Title: Mathematical and Computational Aspects of Materials Science. (Co-PI Carme Calderer). Session NN at the Fall 2014 Materials Research Society Meeting. Dec. 1–4 Boston, MA. Amount $24,000.

2. Principal Investigator, NSF Grant DMS-1833601, August 2018 - July 2019. Title: SIAM TX-LA Section Meeting. Meeting held October 5–7, 2018 at LSU Mathematics Department. Amount $20,000.

Featured Review in American Mathematical Society Mathematical Reviews

1. Lipton R. "Variational methods, bounds, and size effects for composites with highly conducting interface," *Journal of the Mechanics and Physics of Solids*, **45**, 1997, pp. 361–384, MR98c:73007.

2. Lipton R. "Optimal fiber configurations for maximum torsional rigidity," *Archive for Rational Mechanics and Analysis*, **144**, 1998, pp. 79–106, MR2000i:74075.

Supervision of Graduate Students

1. Ph.D. adviser for Robert Viator, LSU. Thesis: "Spectral representation and convergence radii for power series solutions of Maxwell's equations in high contrast electromagnetic media." Ph.D. Summer 2016. Postdoc, Institute for Mathematics and its Applications, 2016 - 2017. Postdoc, Southern Methodist University 2018 - 2020.

2. Ph.D. adviser for Paul Sinz, LSU. Thesis: "Multiscale iterative methods for media with rough coefficients, domain decomposition, and multigrid." Ph.D. Summer 2017. Postdoc, Michigan State University, 2017–2019.

3. Ph.D. adviser for Lokendra Singh Thakur, LSU. Thesis topic: "Reduced order models for beam-wave interaction in high power microwave sources." Ph.D. Summer 2017. Associate researcher at the Broad Institute of MIT and Harvard 2018 - 2020.

4. Ph.D. adviser for Eyad Said, LSU. Thesis topic: "Nonlocal Methods in Fracture Mechanics." Ph.D. Summer 2018. Assistant Professor, Mount Mercy University, Cedar Rapids, IA, Fall 2018.

5. Ph.D. adviser for Xu Huang, LSU. Thesis: "Exponentially convergent multscale spectral generalized finite element methods." Ph.D. Spring 2015. Quantitative analyst, Liberty Mutual Insurance Company, since 2015.

6. Ph.D. adviser for Yue Chen, LSU. Thesis: "Resonance and Double Negative Behavior in Metamaterials." Ph.D. Summer 2012. Postdoctoral Scholar Department of Mathematics University of Kentucky, 2012 - 2015. Tenure track assistant professor Department of Mathematics Auburn University, since September 2015.

7. Ph.D. adviser for Bacim Alali, LSU. Thesis: "Multiscale Analysis of Local Fields in Heterogeneous Media for Local and Nonlocal Continuum Theories." Ph.D. Summer 2008. Wiley Assistant Professor Department of Mathematics University of Utah, 2008-2012. Postdoc, Department of Scientific Computing, Florida State University, 2012-2014. Tenure Track Assistant Professor Department of Mathematics Kansas State University, since September 2014.

8. Ph.D. adviser for Santiago Fortes, LSU. Thesis: "Power Series Expansions for Waves in High-Contrast Plasmonic Crystals." Ph.D. Spring 2010. Postdoc, Applied and Computational Mathematics California Institute of Technology, 2010-2011. Postdoc, Weierstrass Institute, Berlin Germany, 2011-2012.

9. Ph.D. adviser for Silvia Jimenez, LSU. Thesis: "Homogenization of Nonlinear Elliptic Partial Differential Equations." Ph.D. Summer 2010. Visiting Assistant Professor Worcester Polytechnic Institute, 2010-2013. Tenure track Assistant Professor, Department of Mathematics Colgate University, since 2013.

10. Ph.D. adviser for Timothy Breitzman, LSU. Thesis: "Multi Scale Strain Analysis." Ph.D. Summer 2005. Current position: Chief of the Composite Materials Branch AFRL Materials & Manufacturing Directorate, Air Force Research Laboratory, Wright Patterson AFB, Ohio.

11. Ph.D. adviser for Michael Stuebner, LSU. Thesis: "An Inverse Homogenization Design Method for Stress Control in Composites." Ph.D. Summer 2006. Postdoc LSU Mathematics Department, 2006-2007 funded by grants from AFOSR and the Boeing Company. Postdoc North Carolina State University Department of Mathematics, 2007-2010. Research Mathematician Global Energy and Materials Princeton, NJ, 2010-2013. Research Assistant Professor, University of Dayton Research Institute since 2013.

12. Ph.D. adviser for Ani Velo, WPI. Thesis: "Optimal Design of Gradient Fields and Currents." Ph.D. Spring 2000. National Research Council Davies Postdoctoral Fellowship, United States Army Research Laboratory at Aberdeen, MD 2000-2002. Professor Department of Mathematics and Computer Science, University of San Diego, since 2012. Research Consultant Army Research Laboratory, Aberdeen Proving Ground, Maryland 2002-present.

13. Ph.D. adviser for Abiti Adili, LSU. Thesis topic: "Design of Metamaterials for Optics." Graduation date Spring 2019.

14. Ph.D track adviser for Ruchira Perera.

Postdoctoral Mentoring-Advising

1. Prashant K. Jha, Current Affiliation: Postdoc, Louisiana State University, Baton Rouge, LA

2. Anthony Polizzi, Current Affiliation: Synovus Financial Corporation, Mathematics of Finance, Georgia.

3. Tadele Mengesha, Current Affiliation: Associate Professor, University of Tennessee, Knoxville, TN

4. Scott Armstrong, Current Affiliation: Associate Professor, Courant Institute, New York, NY

Grant Supported Postdoctoral Research Projects

1. R. Lipton is currently supporting the postdoctoral research of Prashant Kumar Jha, 2016-2019. Projects include development of mathematical methods and numerical analysis of nonlocal fracture models. Supported by a grant from the Army Research Office, R. Lipton, PI.

2. R. Lipton supported the postdoctoral research of Anthony Polizzi, 2012-2018. Projects include mathematically based design of microwave amplifiers for maximum amplification over a prescribed bandwidth. Supported by the AFOSR MURI, R. Lipton, LSU PI.

3. R. Lipton supported the postdoctoral research of Tadele Mengesha 2009-2011. Projects included mathematics for understanding extreme fields inside microstructured materials and nonlocal models for analysis of fields inside heterogeneous media. This work supported by NSF grant DMS-0807265, July 2008 - 2011, R. Lipton PI.

Significant Presentations

1. College de France Seminar, presentation: "Optimal Fiber Configurations for Maximum Torsional Rigidity," Institute Henri Poincaré, Paris, November 1997.

2. Keynote Lecture: 13^{th} World Congress on Computational Mechanics, presentation: "Optimized Local Basis and Efficient Implementation of Multiscale GFEM," New York, NY, July 22 - 27, 2018.

3. IMA Liquid Crystals, Metamaterials, Transformation Optics, Photonic Crystals, and Solar Cells, presentation " Materials for Controlling the Direction of Light at Different Frequencies," February 27 - March 2, 2018.

4. Conference on Multiscale Problems in Materials and Biology, Leonid Berlyand 60 th Birthday, presentation: "Double Well Potentials and Nonlocal Fracture Modeling," Fields Institute, University of Toronto, Toronto, Canada, June 4-7, 2018.

5. Hausdorff Research Institute for Mathematics, University of Bonn, Winter School on Numerical Analysis of Multiscale Problems. Presented a course on: "Nonlocal Theories for Free Crack Propagation in Brittle Materials," (3 Lectures). January 9-13, 2017.

6. Harold Gay Lecture, "Manipulating Light with Metamaterials and Photonic Crystals." Worcester Polytechnic Institute, Worcester, MA, October 6, 2017.

7. Advances in Mathematics of Finite Elements - - A joint ICES/USACM conference honoring the 90th birthday of Professor Ivo Babuska, presentation: "A Spectral Multiscale Method within a Domain Decomposition Setting," University of Texas, Austin, March 21–22, 2016.

8. Isaac Newton Institute, Cambridge University, Predictive Multiscale Materials Modeling Conference, presentation: "Cohesive Dynamics and Fracture," December 1-4, 2015.

9. Hausdorff Center for Mathematics, University of Bonn, Eighth International Workshop on Meshfree Methods for Partial Differential Equations, presentation: "Cohesive Dynamics and Fracture," September 5-7, 2015.

10. Complex materials: Mathematical models and numerical methods, University of Oslo, presentation: "Cohesive Dynamics and Fracture," Oslo Norway, September June 10-12, 2015.

11. Conference on Variational Modeling in Solid Mechanics, University of Udine, Udine Italy, presentation: "Understanding Dynamic Brittle Fracture as a Macroscopic Limit of Unstable Mesoscopic Dynamics," September 22 - 24, 2014.

12. Imaging, Multi-scale and high contrast PDEs, Seoul, International Congress of Mathematicians 2014 Satellite Conference. Presentation: "Novel Dispersion from Metamaterials." Held at NIMS (National Institute for Mathematical Sciences), Daejeon, Korea, August 7-9, 2014.

13. Computational Multiscale Methods, Mathematisches Forschungsinstitut Oberwolfach, presentation: "Dynamic Brittle Fracture as a Macroscopic Limit of Unstable Mesoscopic Dynamics," June 22–28, 2014.

14. Recent Trends in Differential Equations: Analysis and Discretisation Methods, Institut für Mathematik, TU Berlin, presentation: "Dynamic PDE based fracture propagation as a distinguished limit of unstable nonlocal bond models," Berlin Germany, November 7–9, 2013.

15. Keynote lecture: Advances in Computational Mechanics Conference Celebraiting the 70th Birthday of T.J.R. Hughes, presentation,"Exponentially Convergent Generalized Finite Element Methods for Heterogeneous Media," San Diego, CA., Feb. 24–27,2013.

16. Keynote Lecture: 12^{th} US National Congress on Computational Mechanics, presentation: "Peridynamics, Scaling and Dynamic Fracture in Brittle Materials," Raleigh, NC., July 22–25, 2013.

17. Workshop on Interplay of Theory and Numerics for Deterministic and Stochastic Homogenization, Mathematisches Forschungsinstitut Oberwolfach, presentation: "Optimal Local Bases for Exponentially Convergent Multscale Methods," March 17–23, 2013.

18. Seventh International Workshop Meshfree Methods for Partial Differential Equations, Hausdorff Center for Mathematics, Bonn Germany, presentation: "Multiscale Spectral Methods for Stress Analysis and Nonlocal Formulations for Dynamic Crack Propagation," September 9 - 11, 2013.

19. Mini workshop on Mathematical Analysis for Peridynamics, Mathematisches Forschungsinstitut Oberwolfach, presentation: "Multiscale Dynamics of Heterogeneous Media in the Peridynamic Formulation," January 16–22, 2011. (All talks 30 minutes).

20. NSF Workshop on Challenges in Computational Multiscale Materials Modeling (CCMMM), presentation: "Error Analysis, Bounds and Convergence Issues in Scale Bridging," Westin Arlington Gateway Hotel, Arlington, VA, May 4, 2011.

21. Hierarchical Materials Opportunities and Challenges. Panelest. Materials Research Society, Fall 2011 Meeting, Nov. 28- Dec. 1, 2011, Boston, MA.

22. Keynote Lecture: 11^{th} US National Congress on Computational Mechanics, presentation: "Optimal Local Approximation Spaces for Generalized Finite Element Methods," Minneapolis, MN., July 25–28, 2011.

23. Keynote Lecture: IV European Conference on Computational Mechanics, presentation, "Optimal Design for Stress Control: Explicit Parametrization Via Inverse Homogenization," Paris France, May 16-21, 2010.

24. Keynote Lecture: 9^{th} World Congress on Computational Mechanics, presentation: "On Local-Global Approximation Error for GFEM," , Sydney Australia, July 19-23, 2010.

25. Institute for Mathematics and Its Applications, Workshop: Computing with Uncertainty, presentation: "Multiscale Structural Optimization in the Presence of Uncertainty for Very Large Composite Structures," October 18-22, 2010, Minneapolis, MN.

26. Keynote Lecture: 8^{th} World Congress on Computational Mechanics, presentation: "Failure Initiation and Uncertainty Inside Multi-Scale Random Media," June 30–July 4, 2008, Venice Italy.

27. Keynote Lecture: First American Academy of Mechanics Conference, presentation: "Multi-Scale Stress Analysis Inside Heterogeneous Media and Macroscopic Failure Criteria," New Orleans, Louisiana, June 17–20, 2008.

28. 11^{th} annual Exhibition of the Coalition for National Science Foundation Funding on Capitol Hill, Washington DC, June 21, 2005. Representative of the American Mathematical Society: Presentation entitled, "Mathematics for Advanced Composites Technology."

29. IMA Tutorial/Workshop: Composites: Where Mathematics Meets Industry, presentation: "Composite Properties and Microstructure Part I: Effective Properties; Part II: Strength," February, 2005, Institute for Mathematics and its Applications University of Minnesota, Minneapolis, MN. (Two lectures.)

30. NATO Advanced Research Workshop on Nonlinear Homogenization and Applications, presentation: "Optimal Design of Microstructure for Control of Stress and Stiffness," Kazimierz Dolny, Poland, July 2003.

31. Danish Symposium on Partial Differential Equations, Analysis and Applications, presentation: "Optimal Design of Fiber Reinforced Shafts in the Presence of Imperfect Interface," May 1998, Odense University, Denmark.

Publications: Articles in refereed Journals

1. Lipton R. "On the effective elasticity of a two-dimensional homogenized incompressible elastic composite," *Proceedings of the Royal Society of Edinburgh*, **109**A, 1988, pp. 45–61.

2. Kohn R. V. and Lipton R. "Optimal bounds for the effective energy of a mixture of two isotropic incompressible, elastic materials," *Archive for Rational Mechanics and Analysis*, **102**, 1988, pp. 331–350.

3. Lipton R. and Avellaneda M. "Darcy's law for slow flow past a stationary array of bubbles," *Proceedings of the Royal Society of Edinburgh*, **114**A, 1990, pp. 71–79.

4. Lipton R. "Saturation of the even-order bounds on effective elastic moduli by finite rank laminates," *J. Appl. Phys.*, **67**, 1990, pp. 7300-7306.

5. James R., Lipton R., and A. Lutorborski "Laminar elastic composites with crystallographic symmetry," *SIAM J. Appl. Math.*, **50**, 1990, pp. 683-702.

6. Lipton R. "On the behavior of elastic composites with transverse isotropic symmetry," *Journal of the Mechanics and Physics of Solids*, **39**, 1991, pp. 663-681.

7. Lipton R. "Characterization of bounds and perturbation series for transversely isotropic, incompressible elastic composites," *Journal of Elasticity*, **27**, 1992, pp. 193-225.

8. Lipton R. "Optimal design and relaxation for reinforced plates subject to random transverse loads," *Journal of Probabilistic Engineering Mechanics*, **9**, 1994, p. 167–177.

9. Lipton R. and Northrup J. "Optimal bounds on the in-plane Shear moduli for orthotropic elastic composites," *SIAM Journal on Applied Mathematics*, **54**, 1994, pp. 428–442.

10. Lipton R. "Inequalities for electric and elastic polarization tensors with applications to random composites," *Journal of the Mechanics and Physics of Solids*, **41**, 1993, pp. 809–833.

11. Lipton R. "A saddle point theorem with applications to structural optimization," *Journal of Optimization Theory and Applications*, **81**, 1994, pp. 549–568.

12. Lipton R. and Vernescu B. "Homogenization of two-phase emulsions," *Proceedings of Royal Society of Edinburgh*, **124**A, 1994, pp. 1119–1134.

13. Lipton R. "Optimal bounds on elastic tensors for orthotropic composites," *Proceedings of the Royal Society of London A*, **443**, 1994, pp. 399–410.

14. Diaz A., Lipton R. and Soto C. "A new formulation of the problem of optimum reinforcement of Reissner-Mindlen plates," *Computer Methods in Applied Mechanics and Engineering*, **123**, 1994, pp. 121–139.

15. Lipton R. "Composites with symmetries and their extremal properties," *International Journal of Solids and Structures*, **31**, 1994, pp. 3407–3417.

16. Lipton R. "On optimal reinforcement of plates and design parameters," *Control and Cybernetics*, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland, **23**, 1994, pp. 481–493.

17. Bendsøe M., A. Diaz A., Lipton R., and Taylor J. "Optimal design of material properties and material distribution for multiple loading conditions." *Int. J. Num. Meth. Engng.*, **38**, 1995, pp. 1149–1170.

18. Lipton R. and Vernescu B. "Variational methods, size effects, and extremal microgeometries for elastic composites with imperfect interface." *Mathematical Methods and Models in Applied Sciences*, **5**, 1995, pp. 1139–1173.

19. Lipton R. and Vernescu B. "Composites with imperfect interface," *Proc. Royal Soc. London A.*, **452**, 1996, pp. 329–358.

20. Cox S. and Lipton R. "Extremal eigenvalue problems for two phase conductors." *Archive for Rational Mechanics and Analysis*, **136**, 1996, pp. 101–117 .

21. Hammer V. B. , Bendsoe M. P., Lipton R., and P. Pedersen "Parametrization in laminate design for optimal compliance, *International Journal of Solids and Structures*, **34**, 1996, pp. 415–434.

22. Lipton R. and Vernescu B. "Critical radius, size effects, and inverse problems for composites with imperfect interface." *Journal of Applied Physics.*, **79**, 1996, pp. 8964–8966.

23. Lipton R. "The second Stekloff eigenvalue of an inclusion and new size effects for composites with interface thermal barriers," *Journal of Applied Physics*, **80**, 1996, pp. 5583–5586.

24. Lipton R. "Reciprocal relations, bounds, and size effects for composites with highly conducting interface." *SIAM Journal on Applied Mathematics*, **57**, 1997, pp. 347–363.

25. Lipton R. and Diaz A."Reinforced Mindlin plates with extremal stiffness, " *International Journal of Solids and Structures*, **28**, 1997, pp. 3691–3704.

26. Diaz A and Lipton R. "Optimal layout for 3 dimensional elastic structures." *Structural Optimization*, **13**, 1997, pp. 60–64.

27. Bendsoe M. and Lipton R. "Extremal overall elastic response of polycrystalline materials," *Journal of the Mechanics and Physics of Solids*, **45**, 1997, pp. 1765–1780.

28. Lipton R. "Variational methods, bounds, and size effects for composites with highly conducting interface," *Journal of the Mechanics and Physics of Solids*, **45**, 1997, pp. 361–384, MR98c:73007.

29. Lipton R. "Energy minimizing configurations of two imperfectly bonded conductors," *Control and Cybernetics*, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland, **27**, 1998, pp. 217–234.

30. Lipton R. "Heat conduction in fine scale mixtures with interfacial contact resistance." *SIAM Journal on Applied Mathematics*, **58**, 1998, pp. 55–72.

31. Lipton R. "Optimal fiber configurations for maximum torsional rigidity," *Archive for Rational Mechanics and Analysis*, **144**, 1998, pp. 79–106, MR2000i:74075.

32. Lipton R. "Influence of interfacial surface conduction on the DC electrical conductivity of particle reinforced composites," *Proceedings of the Royal Society of London Ser. A.*, **454**, 1998, pp. 1371–1382.

33. Lipton R. "The second Stekloff eigenvalue and energy dissipation inequalities for functionals with surface energy," *SIAM Journal on Mathematical Analysis*, **29**, 1998, pp. 673–680.

34. Lipton R. " Variational methods, bounds, and size effects for two-phase composites with coupled heat and mass transport processes at the two phase interface." *Journal of the Mechanics and Physics of Solids*, **47**, 1999, pp. 1699–1736.

35. Lipton R. "An Isoperimetric inequality for the torsional rigidity of imperfectly bonded fiber reinforced shafts," *Journal of Elasticity* **55**, 1999, pp. 1 - 10.

36. Lipton R. and D. R. S. Talbot, " The effect of the interface on the dc transport properties of nonlinear composite materials," *Journal of Applied Physics*, **86**, 1999, pp. 1480–1487.

37. Diaz A. and Lipton R. "Optimal material layout in three-dimensional elastic structures subjected to multiple loads," *Mechanics of Structures and Machines*, **28**, 2000, pp. 219–236.

38. Lipton R. " Optimal bounds on electric-field fluctuations for random composites," *Journal of Applied Physics*, **88**, 2000, pp. 4287–4293.

39. Lipton R. and Talbot D. R. S. "Bounds for the effective conductivity of a composite with imperfect interface," *Proceedings of the Royal Society of London: Mathematical, Physical and Engineering Sciences*, **457**, 2001, pp. 1501–1517.

40. Lipton R. "Reinforcement of elastic structures in the presence of imperfect bonding," *Quarterly of Applied Mathematics*, **59**, 2001, pp. 353-364.

41. Lipton R. "Effect of interfacial bonding on fiber reinforced shafts subject to anti-plane shear," *International Journal of Solids and Structures*, **38**, 2001, pp. 369–387.

42. Lipton R. "Optimal inequalities for gradients of solutions of elliptic equations occurring in two-phase heat conductors," *SIAM Journal on Mathematical Analysis*, **32**, 2001, pp. 1081–1093.

43. Lipton R. " Optimal bounds on field fluctuations for random composites - three dimensional problems," *Journal of Applied Physics*, **89**, 2001, pp. 1371–1376.

44. Lipton R. "Design of functionally graded composite structures in the presence of stress constraints," *International Journal of Solids and Structures*, **39**, 2002, pp. 2575–2586.

45. Lipton R. and Velo A. "Optimal design of gradient fields with applications to electrostatics," *Nonlinear Partial Differential Equations and Their Applications: College De France Seminar Volume XIV*, Edited by D. Cioranescu and J.-L. Lions, Studies in Mathematics and its Applications, vol. 31, Elsevier, Amsterdam, 2002, pp. 509–532.

46. Lipton R. "Relaxation through homogenization for optimal design problems with gradient constraints," *Journal of Optimization Theory and Applications*, **114**, 2002, pp. 27–54.

47. Lipton R. "Configurations of nonlinear materials with electric fields that minimize L^p norms," *Physica B*, **338**, 2003, pp. 48–53.

48. Lipton R. "Assessment of the local stress state by macroscopic variables," *Philosophical Transactions of the Royal Society of London A*, **361**, 2003, pp. 921–946.

49. Lipton R. "Stress constrained G closure and relaxation of structural design problems," *Quarterly of Applied Mathematics*, **62**, 2004, pp. 295–321.

50. Lipton R. and Chen T. "Bounds and extremal configurations for the torsional rigidity of coated fiber reinforced shafts." *SIAM J. Applied Mathematics,* **65**, 2004, pp. 299–315.

51. Lipton R. "Homogenization theory and the assessment of extreme field values in composites with random microstructure." *SIAM J. Applied Mathematics,* **65**, 2004, pp. 475–493.

52. Lipton R. "Optimal lower bounds on the electric-field concentration in composite media". *Journal of Applied Physics*, **96**, 2004, pp. 2821–2827.

53. Lipton R. "Bounds on the distribution of extreme values for the stress in composite materials." *Journal of the Mechanics and Physics of Solids,* **52**, 2004, pp. 1053–1069.

54. Zheng Z., Forest M. G., Lipton R., Zhou R., and Wang A. "Exact scaling laws for electrical conductivity properties of nematic polymer nano-composite monodomains." *Advanced Functional Materials*, **15**, 2005, pp. 627–638.

55. Lipton R. "Optimal lower bounds on the hydrostatic stress amplification inside random two-phase elastic composites." *Journal of the Mechanics and Physics of Solids*, **53**, 2005, pp. 2471–2481.

56. Lipton R. "Optimal lower bounds on the dilatational strain inside random two-phase elastic composites subjected to hydrostatic loading." *Mechanics of Materials*, **38**, 2006, pp. 833-839.

57. Lipton R. "Homogenization and field concentrations in heterogeneous media." *SIAM J. on Math. Analysis*, **38**, 2006, pp. 1048–1059.

58. Lipton R. and Stuebner M. "Optimization of composite structures subject to local stress constraints." *Computer Methods in Applied Mechanics and Engineering*, **196**, 2006, pp. 66–75.

59. Lipton R. and Stuebner M. "Inverse homogenization and design of microstructure for pointwise stress control." *Quarterly Journal of Mechanics and Applied Mathematics*, **59**, 2006, pp. 139–161.

60. Chen, T. and Lipton, R. "Bounds for the torsional rigidity of shafts with arbitrary cross sections containing cylindrically orthotropic fibers." *Proceedings of the Royal Society of London,* **A436**, 2007, pp. 3291–3309.

61. Breitzman T., Lipton R, and Iarve E. "Local field assessment inside multiscale composite architectures." *SIAM Multiscale Modeling and Simulation,* **6**, 2007, pp. 937–962.

62. Lipton R. and Stuebner M. "Optimal design of composite structures for strength and stiffness: an inverse homogenization approach." *Structural and Multidisciplinary Optimization*, **33** 2007, pp. 351–362.

63. Babuška, I., Lipton, R. and Stuebner, M. "The penetration function and its application to microscale problems." *BIT Numerical Mathematics,* **48**, 2008, pp. 167–187.

64. Lipton, R. and Stuebner M. "A new method for design of composite structures for strength and stiffness." *American Institute of Aeronautics and Astronautics* Paper AIAA 2008-5986.

65. Alali, B. and Lipton, R. "Optimal lower bounds on local stress inside random media," *SIAM Journal On Applied Mathematics*, **70**, 2009, pp. 1260–1282.

66. Chen, Y, and Lipton, R. "Tunable double negative band structure from non-magnetic coated rods," *New Journal of Physics,* **12**, 2010, 083010.

67. Fortes, S., Lipton, R., and Shipman, S. "Sub-wavelength plasmonic crystals: dispersion relations and effective properties," *Proc. Roy. Soc. London A.,* **466**, 2010, pp. 1993–2020.

68. Chen, Y. and Lipton, R. "Optimal lower bounds on the local stress inside random thermoelastic composites," *Acta Mechanica,* **213**, 2010, pp. 97–109.

69. Jimenez, S. and Lipton, R. "Correctors and field fluctuations for the $p_\epsilon(x)$-Laplacian with rough exponents," *J. Math. Anal. Appl.,* **372**, 2010, pp. 448–469.

70. Babuška, I. and Lipton, R. "Optimal local approximation spaces for generalized finite element methods with application to multiscale problems," *Multiscale Modeling and Simulation, SIAM*, **9**, 2011, pp. 373–406.

71. Babuška, I. and Lipton, R. "L^2 global to local projection: an approach to multiscale analysis," *M3AS*, **21**, 2011, pp. 2211–2226.

72. Fortes, S., Lipton, R. and Shipman, S., "Convergent Power Series for Fields in Positive or Negative High-Contrast Periodic Media," *Communications in Partial Differential Equations,* **36**, 2011, pp. 1016–1043.

73. Alali, B. and Lipton, R. "Multiscale analysis of heterogeneous media in the peridynamic formulation," *Journal of Elasticity,* **106**, 2012, pp. 71–103.

74. Lipton, R., Stuebner, M. and Lua, Y. "Multi-Scale Quasistatic Damage Evolution for Polycrystalline Materials," *International Journal of Engineering Science*, **58**, 2012, pp. 85–94.

75. Alali, B. and Lipton, R. "New bounds on local strain fields inside random heterogeneous materials," *Mechanics of Materials*, **53**, 2012, pp. 111–122.

76. Lipton, R. and Mengesha, T. " Representation formulas for L-infinity norms of weakly convergent sequences of gradient fields in homogenization." *ESAIM: Mathematical Modeling and Numerical Analysis,* **46**, 2012, pp 1121–1146.

77. Chen, Y. and Lipton, R. "Multiscale methods for engineering double negative metamaterials," *Photonics and Nanostructures – Fundamentals and Applications* **11**, 2013, pp. 442–452.

78. Chen, Y. and Lipton, R. "Resonance and double negative behavior in metamaterials," *Archive for Rational Mechanics and Analysis*, September 2013, Volume 209, Issue 3, pp. 835–868.

79. Chen, Y. and Lipton, R. "Double Negative Dispersion Relations from Coated Plasmonic Rods," *Multiscale Modeling and Simulation, SIAM* 2013, Vol. 11, No. 1, pp. 192–212.

80. Lipton, R. "Dynamic brittle fracture as a small horizon limit of peridynamics," *Journal of Elasticity*, October 2014, **117**, Issue 1, pp 21-50.

81. Lipton, R. and Polizzi, A. "Tuning gain and bandwidth of traveling wave tubes using metamaterial beam-wave interaction structures," *Journal of Applied Physics* **116** (2014) 144504. [http://dx.doi.org/10.1063/1.4897235]

82. Babuška, I., Huang, X., and Lipton, R. "Machine computation using the exponentially convergent multiscale spectral generalized finite element method," *ESAIM: Mathematical Modeling and Numerical Analysis* **48** 2014, pp. 493 –515.

83. Du, Q., Lipton, R., and Mengesha, T. "Multiscale analysis of an abstract evolution equation with applications to nonlocal models for heterogeneous media." *ESAIM: Mathematical Modeling and Numerical Analysis,* **50**, Number 5, 2016, pp. 1425–1455.

84. Lipton, R., Sinz, P., and Stuebner, M. "Uncertain loading and quantifying maximum energy concentration within composite structures," *Journal of Computational Physics*, **325**, (2016), pp. 38–52.

85. Lipton, R. "Cohesive dynamics and brittle fracture," *Journal of Elasticity*, **124**, Issue 2, 2016, pp. 143–191.

86. Lipton, R., Polizzi, A., and Thakur, L. "Novel metamaterial surfaces from perfectly conducting subwavelength corrugations." *SIAM J. on Applied Mathematics*, **77** (2017), pp. 1269–1291.

87. Lipton, R. and Viator, R. "Creating band gaps in periodic media," *SIAM Multiscale Modeling and Simulation.* **15** (2017), pp. 1612–1650.

88. Lipton, R. and Viator, R. "Bloch waves in crystals and periodic high contrast media," *ESAIM: Mathematical Modeling and Numerical Analysis,* **51**, (2017), pp. 889–918.

89. Jha, K.P., and Lipton, R. "Numerical convergence of nonlinear nonlocal continuum models to local elastodynamics." *Int. J. Numerical Methods in Engineering.* Published March 12, 2018, https://doi.org/10.1002/nme.5791.

90. Lipton, R. and Said, E., and Jha, P., "Free damage propagation with memory," *Journal of Elasticity.* Published March 14, 2018, https://doi.org/10.1007/s10659-018-9672-7.

91. Lipton, R., and Schweizer, B. "Effective Maxwell's equations for perfectly conducting split ring resonators." *Archive for Rational Mechanics and Analysis.* Published March 22, 2018, https://doi.org/10.1007/s00205-018-1237-1.

92. Jha, K.P., and Lipton, R. "Numerical analysis of nonlocal fracture models in Hölder space," *SIAM J. Numer. Anal.* **56** (2018), pp. 906–941.

93. Jha, K.P., and Lipton R., " Numerical convergence of finite difference approximations for state based peridynamic fracture models." Computer Methods in Applied Mechanics and Engineering, in revision, 2018.

94. Jha, K.P., and Lipton R., "Convergence analysis of finite element approximation for state-based nonlocal fracture models." Submitted to Communications on Applied Mathematics and Computation, 2018.

95. Chen, Y., and Lipton, R., "Controlling refraction using sub-wavelength resonators." Appl. Sci. 2018, 8(10), 1942; doi:10.3390/app8101942.

96. Lipton, R., Lehoucq, R. and P. Jha, "Complex Fracture Nucleation and Evolution with Nonlocal Elastodynamics." submitted to Journal of Peridynamics and Nonlocal Modeling.

97. Jha, K.P. and Lipton, R., "Finite element approximation of nonlocal fracture models." *IMA Journal of Numerical Analysis.* In revision 2018.

98. Babuška, I., Lipton, R., Sinz, P., and Stuebner, M. "Optimal oversampling and implementation of multiscale-spectral GFEM. *In preparation.*

SIAM News

Du, Q. and Lipton, R. "Peridynamics, fracture, and nonlocal continuum models," *SIAM News*, **47**, no. 3, April 2014 (Featured article).

Book Chapters

1. Lipton R. "Homogenization and design of functionally graded composites for stiffness and strength," in *Nonlinear Homogenization and its Application to Composites, Polycrystals, and Smart Materials,* P. Ponte Castaneda, et. al. (Eds.), Springer Verlag, Berlin, NATO Science series II Mathematics, Physics, and Chemestry, **170**, 2004, pp. 169–192.

2. Lipton R. "Dynamic Fracture as an Upscaling of Mesoscopic Dynamics," in *Handbook of Peridynamic Modeling*, F. Bobaru, J. Foster, P. Guebelle, and S. Silling Eds. Chapman and Hall/CRC, 2016.

3. Jha, P. and Lipton, R. Chapter: "Well Posed Nonlinear Nonlocal Fracture Models Associated with Double Well Potentials." In *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, First Online, Editor George Z. Voyiadjis, Springer, 2018.

4. Jha, P. and Lipton, R. Chapter: "Finite Differences and Finite Elements in Nonlocal Fracture Modeling: A-priori Convergence Rates." In *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, First Online, Editor George Z. Voyiadjis, Springer, 2018.

5. Lipton, R., Said, E., and Jha, P. Chapter: "Dynamic Damage Propagation with Memory: A State Based Model." In *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, First Online, Editor George Z. Voyiadjis, Springer, 2018.

6. Lipton, R., Said, E., and Jha, P. Chapter: "Dynamic Brittle Fracture From Nonlocal Double Well Potentials: A State Based Model." In *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, First Online, Editor George Z. Voyiadjis, Springer, 2018.

7. Lipton, R., Polizzi, A., and Thakur, L. Chapter "Perturbation Analysis of Maxwell's Equations." In *High Power Microwave Sources and Technologies Using Metamaterials*, In press, Editor Edl Schamiloglu, Wiley/IEEE, 2019.

Preprints

Diehl, P., Lipton, R, and Schweitzer, M. A. "Numerical verification of a bond-based softening peridynamic model for small displacements: deducing material parameters from classical linear theory," 2017. *Preprint. Institute for Numerical Simulation, University of Bonn.*

Work in progress

1. "Design of Metamaterials for Optics," with Abiti Adili.

2. "Metamaterials for new hybrid mode excitation of high power microwave amplifiers," with Yue Chen and Anthony Polizzi.

3. "A new paradigm for generating omni directional three dimensional band gaps from patterned dielectrics," with Silvia Jimenez and Robert Viator.

4. "Γ-convergence of nonlocal energies and sharp fracture like limits of solutions of nonlocal dynamics," with Prashant Jha.

5. "Novel kinetic relations for fracture evolution from nonlocal models," with Kaushik Dayal.

Lecture Notes

70 Graduate-undergraduate lectures (over 1800 pages) on plasmonics and optimal design of heterogeneous media, 2005-present.

Organization of Conferences, Workshops and Symposia

1. Organizing committee Chair, First annual SIAM TX-LA Section Conference LSU, Mathematics Department, Baton Rouge, LA, October 5-7, 2018.

2. Conference Co-Chair, SIAM Mathematical Aspects of Materials Science 2018 (MS18) July 9-13, Portland Convention Center, Portland, OR, USA.

3. Member of organizing committee for: SIAM Conference on Nonlinear Waves and Coherent Structures (NW16) August 8 -11, 2016, Sheraton Society Hill Hotel, Philadelphia, Pennsylvania, USA.

4. Member of organizing committee for: SIAM Conference on Mathematical Aspects of Materials Science (MS16) May 8 -12, 2016, Sheraton Society Hill Hotel, Philadelphia, Pennsylvania, USA.

5. Institute for Mathematics and its Applications (IMA) Workshop: Liquid Crystals, Metamaterials, Transformation Optics, Photonic Crystals, and Solar Cells, University of Minnesota, Minneapolis, MN, February 27- March 2, 2018. Co-organized with Carme Calderer, Antal Jaki, and Richard James.

6. Materials Research Society Symposium NN: Mathematical and Computational Aspects of Materials Science, December 1 - 4, 2014, Hynes Convention Center, Boston MA, USA. Co-organized with Carme Calderer, Dio Margetis, and Felix Otto.

7. Member of organizing committee for: SIAM Conference on Mathematical Aspects of Materials Science (MS13) June 9 -12, 2013, Doubletree by Hilton Hotel, Philadelphia, Pennsylvania, USA.

8. 2013 PI Summer Graduate Program Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes University of Minnesota, Minneapolis, MN July 15 - August 2, 2013. Co-organized with Carme Calderer, Dio Margetis, and Felix Otto.

9. Institute for Mathematics and its Applications (IMA) Special Workshop: Mathematics and the Materials Genome Initiative, University of Minnesota, Minneapolis, MN, September 12-15, 2012. Co-organized with Carme Calderer, Dio Margetis, and Felix Otto.

10. Advancing Infrastructure for Materials Design and Application: The Materials Genome Initiative, 2012 SIAM Annual Meeting July 8–13, 2012 Minneapolis, MN. Co-organized with Carme Calderer.

11. The Mathematics of Modeling Multiscale Heterogeneous Media, 2011 AMS Joint Mathematical Meeting, New Orleans, LA, January 6–9, 2011. Co-organized with Tadele Mengesha.

12. Analytical and Numerical Methods for Nonlocal Problems, ICIAM 2011, Vancouver, BC, July 18–22, 2011. Co-organized with Burak Aksoylu and Tadele Mengesha.

13. IAMCS Workshop on Computational and Mathematical Challenges in Material Science and Engineering: Multi-Scale Materials Modeling: Nano-Scale to Macro-Scale Materials Modeling and Hybrid Theories. Co-Organizer with Professor P. Kuchment (TAMU, MATH/IAMCS), Professor D. C. Lagoudas (TAMU, AERO), Professor J. R. Walton (TAMU, MATH/IAMCS), Texas A&M University, December 2–3, 2009.

14. Topology optimization and material design using homogenization and weak convergence methods, World Congress on Structural and Multidisciplinary Optimization,WCSMO-8 Lisbon Portugal, LNEC Conference Centre in Lisboa, June 1–5, 2009.

15. Local Field Properties, Microstructure, and Multiscale Phenomena in Heterogeneous Media, Society for Engineering Science 45^{th} Annual Technical Meeting, University of Illinois at Urbana Champaign, October 21-15, 2008.

16. Uncertainty Quantification in Materials Science, 2008 SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia Pennsylvania, May 11–14.

17. Stresses and Interfaces in Microstructured Media, SIAM Conference on Analysis of Partial Differential Equations, Mesa Arizona December 10-12, 2007.

18. Transport Properties of Micro-structured Media and Composite Materials, Society for Engineering Science 44^{th} Annual Technical Meeting, College Station Texas, October 21-24, 2007.

19. Symposium on Microstructure and PDE, 6th International Congress on Industrial and Applied Mathematics, Zurich, July 16-20, 2007.

20. Special SIAM Session on Mathematics and Materials Science, 113th Annual Meeting of the American Mathematical Society, Joint Mathematics Meeting, New Orleans, LA, January 2007.

21. Microstructure and PDE, SIAM conference on Analysis of Partial Differential Equations, Boston Massachusetts, July 2006

22. Novel Methods in Nonlinear Homogenization, Society for Engineering Science 42^{nd} Annual Technical Meeting, Pennsylvania State University, August 2006.

23. Symposium on Homogenization Theory, In honor of Ivo Babuska's 80th Birthday, 8th U.S. National Congress on Computational Mechanics, University of Texas, Austin Texas, July 2005.

24. Symposium on Novel Numerical Methodologies for Heterogeneous Media, Joint ASME/ASCE/SES Conference on Mechanics and Materials, LSU, Baton Rouge Louisiana, June 2005.

25. Special Session on Applied Mathematics in Materials Science. AMS Southeastern Section Meeting, March 2003, Baton Rouge, LA.

26. Mini Symposium on Optimal Design of Structures and Microstructures in the Third SIAM Conference on Mathematical Issues in Materials Science. Philadelphia, PA. May 2000.

27. Mini Symposium on Size Effects for Linear and Nonlinear Composite Materials in the Second SIAM Conference on Mathematical Issues in Materials Science. Philadelphia, PA. May 1997.

28. Workshop on the Effect of the Interface for Nonlinear Elastic and Plastic Composites. Society for Engineering Science Meeting, November 1995, New Orleans LA.

Invited Colloquia and Seminars

1. "Predicting Complex Fracture Evolution using Nonlocal Dynamics," Department of Mathematics, Colloquium, University of Nebraska, Lincoln Nebraska, September 14, 2018.

2. "Electric and Magnetic Fields inside Optical Metamaterials: Non-coercive Bilinear Forms and Neumann Poincare Spectrum." Institute for Computational Engineering and Sciences Seminar, University of Texas, September 14, 2017.

3. "Double Well Potentials and Nonlocal Brittle Fracture Modeling." Aerospace Engineering Seminar, University of Texas, September 28, 2017.

4. "Nonlocal Models for Complex Fracture Simulations." Babuška Seminar, ICES, University of Texas, October 20, 2017.

5. "Wave Phenomena in Metamaterials and Photonic Crystals," Applied and Computational Math Colloquium, University of Minnesota, February 20, 2017.

6. "Propagation of Complex Fracture," Mathematisches Forschungsinstitut Oberwolfach, Mechanics of Materials: Mechanics of Interfaces and Evolving Microstructure, March 13–19, 2016.

7. "Cohesive Dynamics and Fracture," Department Seminar, Department of Aerospace and Mechanical Engineering, University of Notre Dame, September 29, 2015.

8. "Novel Dispersion from Metamaterials," Colloquium, Department of Mathematical Sciences, New Jersey Institute of Technology, September 25, 2015.

9. "Cohesive Dynamics and Fracture," Colloquium of the Modeling, Numerics, Differential Equations Group, Technical University of Berlin, May 19, 2015.

10. "Cohesive Dynamics and Fracture," Applied Mathematics Colloquium, University of North Carolina, April 17, 2015.

11. "The Mathematics of Dispersion in Electromagnetic Meta-Materials," Department of Mathematical Sciences, University of Delaware, March 19, 2015.

12. "Cohesive Dynamics and Fracture," Computational and Applied Mathematics Seminar, Department of Mathematics, Purdue University, February 23, 2015.

13. "The Dynamics of Unstable Mesoscopic Interactions and Dynamic Brittle Fracture as Seen at the Macroscale," Sandia National Laboratory, April 2, 2014.

14. "Dispersion Engineering with Metamaterials," Department of Civil and Environmental Engineering, Seminar, Carnegie Mellon University, March 28, 2014.

15. "Connecting the Dynamics of Unstable Mesoscopic Interactions to Dynamic Brittle Fracture as Seen at the Macroscale," Institute for Computational Science and Engineering, University of Texas, March 18, 2014.

16. "Controlling Beam-Wave Interaction in Traveling Wave Tubes Using Metamaterials," FY-12 AFOSR MURI on Transformational Electromagnetics Mini-Workshop, Department of Electrical Engineering and Computer Science, University of New Mexico, March 10, 2014.

17. "Dispersion Engineering for Optical Meta-Materials," Institute for Computational Science and Engineering Thematic Workshop on Multi-scale Modeling, University of Texas, April 29–May 1, 2013.

18. "The Mathematics of Dispersion for Optical Meta-materials," Mathematics Collquium, University of Pittsburgh, April 12, 2013.

19. "The Mathematics of Dispersion in Electromagnetic Meta-Materials," Applied and Computational Mathematics Seminar, Georgia Tech., February 4, 2013.

20. "Engineering the Dispersive Properties for Meta-Material Crystals," Electromagnetics and Electroacoustics Seminar, Department of Electrical and Computer Engineering, University of Texas Austin, TX April 27, 2012.

21. "Dispersion Engineering in Electromagnetic Meta-Materials," ICES Seminar, Institute for Computation and Engineering Sciences, University of Texas, Austin, TX, April 18, 2012.

22. Air Force Research Laboratories Integrated Computational Materials Science and Engineering Seminar, Wright Patterson Laboratories, WPAFB, August 4, 2011.

23. Mathematics Colloquium, Worcester Polytechnic Institute, Worcester, MA., April 2011.

24. ICES Seminar, Institute for Computation and Engineering Sciences, University of Texas, Austin, TX, December 2010.

25. Mathematics Colloquium, Department of Mathematics University of Houston, Houston, TX, September 2010.

26. Mathematics Colloquium, Department of Mathematics University of Tennessee, Knoxville, TN, April, 2009.

27. Computational Science Seminar, Florida State University, Tallahassee, FL, April 2009.

28. Numerical Analysis Seminar, University of Maryland Department of Mathematics, College Park MD, December 2008.

29. Computational Modeling Seminar, Sandia National Laboratories, Albuquerque, NM, November 2008.

30. Mathematics Seminar, University of Rome I, Rome Italy, June 2008.

31. Department of Mechanical Science and Engineering Seminar, University of Illinois Urbana-Champaign, February 2008.

32. Mathematics Seminar, University of Louisiana, Lafayette, Louisiana, February 2008

33. Mathematics Colloquium, Iowa State University, Ames, Iowa, April 2007.

34. Mathematics Colloquium, University of Kentucky, Lexington, Kentucky, April 2007.

35. Mathematics Colloquium, University of Akron, Akron, OH, March 2007.

36. Mathematics Colloquium, Oregon State University, Corvallis, OR, February 2007.

37. Mathematics Colloquium, Washington State University, Pullman, WA, February 2007.

38. Applied Mathematics Seminar, Washington State University, Pullman, WA, February 2007.

39. ICES Seminar, University of Texas Austin, TX, February 2007.

40. Boeing Phantom Works, Seattle, WA, May 2006. Presentation entitled, "Stress Transfer between macroscopic and microscopic length scales in random media."

41. Mathematics Colloquium, Department of Mathematics, Florida State University, March 2006.

42. Applied Mathematics Seminar, Department of Mathematics, Texas A & M University, February 2006.

43. Applied Mechanics Colloquium, Division of Engineering and Applied Sciences, Harvard University, April 2005.

44. Mathematics Colloquium, Department of Mathematical Sciences, WPI, April 2005.

45. Applied Analysis Seminar, Department of Mathematics and Statistics, University of Massachusetts Amherst, April 2005.

46. Mathematics Colloquium, Mathematics Department, University of Kentucky, March 2005.

47. Applied Mathematics Seminar, Tulane University, February, 2005.

48. Mechanics Seminar, Department of Mechanical Engineering, Massachusetts Institute of Technology, February 2005.

49. Mechanics Colloquium, Department of Mechanical and Aerospace Engineering, University of Florida, February 2005.

50. Analysis Seminar, Department of Mathematics, University of Pennsylvania, February 2005.

51. PDE Seminar, Department of Mathematics, Brown University, October 2004.

52. ICES Seminar, University of Texas at Austin, May 2004.

53. Center for Nonlinear Analysis, Carnegie Mellon University, March 2004.

54. Tulane University Department of Mathematics, February 2004.

55. "Multi-scale Stress Analysis," at the Third DOE Workshop on Multiscale Methods, Portland, Oregon, September, 2004, http://multiscalemath.pnl.gov.

56. "Stress Assessment in Composite Materials," Society for Natural Philosophy Meeting/IMA PI Conference, Multiscale Effects in Material Microstructures and Defects, University of Kentucky, September 2003, http://www.ms.uky.edu/~mclxyh/snpmeeting.html.

57. Wichita State University Lecture Series in Mathematical Science, April 2003

58. University of North Carolina Applied Mathematics Colloquium, October 2002

59. University of Paris VI Laboratoire Jacques-Louis Lions, European homogenization network Seminar, June 2002

60. Texas A & M, Department of Mathematics, Colloquium, Spring 2002

61. Georgia Institute of Technology Department of Mathematics, Colloquium, Spring 2002

62. Tulane University Department of Mathematics, Colloquium, Fall 2001

63. New Jersey Institute of Technology Department of Mathematics, Colloquium,Fall 2001

64. Duke University Department of Mathematics, Applied Math Seminar, Fall 2001

65. Indiana University Department of Mathematics, Spring 2001

66. California Institute of Technology Department of Applied and Computational Mathematics, Applied Mathematics Seminar, Winter 2001

67. Temple University Department of Mathematics, Colloquium, Fall 2000

68. Coventry University Department of Mathematics, Colloquium, Fall 2000

69. University of Pennsylvania, Mechanical Engineering Department, Colloquium, Fall 2000

70. Rensselaer Polytechnic Institute, Mechanical Engineering Department, Coloiioquium, Winter 1999

71. Oxford University Mathematics Institute, Applied Mathematics Seminar, Spring 1998

72. College de France Seminar, Fall 1997

73. O.N.E.R.A. Paris, France, Fall 1997

74. University of Paris VI Continuum Mechanics Seminar, Fall 1997

75. University of Rouen Mathematics Department, Colloquium, Fall 1997

76. Technical University of Denmark Mathematics Department, Colloquium, Fall 1997

77. University of Bath Mathematics Department, Colloquium, Fall 1997

78. Stanford University Mathematics Department, Applied Mathematics Seminar, Spring 1997

79. University of Arizona Mathematics Department, Applied Mathematics Seminar, Spring 1997

80. University of Michigan Mathematics Department, Applied Mathematics Seminar, Spring 1997

81. University of Utah Mathematics Department, Applied Mathematics Seminar, Spring, 1997

82. Technical University of Denmark Mathematics Institute, Colloquium, Fall 1996

83. Brown University Division of Applied Mathematics, Colloquium, Fall 1996

84. University of Utah Mathematics Department, Applied Mathematics Seminar, Spring 1996

85. Tufts University Mathematics Department, Colloquium, Fall 1995

86. University of Michigan Mathematics Department, Applied Mathematics Seminar, Spring 1994

87. University of Michigan Aerospace Engineering Department, Colloquium, Spring, 1994

88. University of Michigan Aerospace Engineering Department, Colloquium, Spring, 1993

89. University of Massachusetts at Amherst Mathematics Department, Colloquium, Spring 1993

90. Rice University Department of Mathematics, Colloquium, Fall, 1992

91. Eastman Kodak Company, Spring, 1991

92. Courant Institute of Mathematical Sciences, Colloquium, Spring, 1991

93. Brown University Division of Applied Mathematics, Applied Mathematics Seminar, Spring, 1991

94. University of Delaware Mathematics Department, Colloquium, Spring, 1991

95. Clarkson University Mathematics Department, Spring, Colloquium, 1991

96. University of Southern California Mathematics Department, Colloquium, Spring, 1990

97. Stanford University Mathematics Department, Applied Mathematics Seminar, Spring, 1990

98. University of California at Berkeley Mathematics Department, PDE Seminar, Fall, 1989

99. "Three Lectures on Homogenization Theory," Department of Mathematics, Universidad National Autonoma De Mexico, Mexico City, Summer, 1989.

Invited Presentations at Conferences and Workshops

1. "Perturbation Analysis of the Maxwell Equation," FY 12 Transformational Electromagnetics MURI Capstone Meeting, March 15, 2018, Arlington, VA.

2. "Damage with memory: a non-local state based model," Nonlocal Methods for Fracture, University of Texas, January 15–16, 2018.

3. "Analysis of finite difference approximations to nonlocal fracture models," Modeling Analysis and Numerics for Nonlocal Applications, Santa Fe, NM, December 11–15, 2017

4. "Nonlocal theories for free crack propagation in brittle materials," 14th U.S. National Congress on Computational Mechanics, Montréal, July 17–20, 2017.

5. "GFEM computations in heterogeneous solids using optimal local bases," 14th U.S. National Congress on Computational Mechanics, Montréal, July 17–20, 2017.

6. "An iterative method for multiscale composite structures, "14th U.S. National Congress on Computational Mechanics, Montréal, July 17–20, 2017.

7. 'Optimizing up converting nanoparticle suspensions for absorption of NIR and UV emission'", Topic Review of Photomechanical Effects in Solids, Office of Naval Research, Phoenix Arizona April 17, 2017.

8. "Double well potentials and nonlocal brittle fracture modeling," SIAM Conference on Computational Science and Engineering 2017, February 27 - March 3, 2017, Atlanta Georgia.

9. "Spectral theory without ellipticity: Bloch waves and separation of frequency spectra," 2016 SIAM Conference on Mathematical Aspects of Materials Science, May 8-12, 2016, Philadelphia, PA.

10. "High contrast periodic media: Bloch waves and band gaps," AMS Joint Mathematics Meetings, January 6–9, 2016, Seattle, WA.

11. "Extracting gain from hybrid modes using sub-wavelength geometries," FY 12 Transformational Electromagnetics MURI Year 3 Review, October 21, 2015, Arlington, VA.

12. "Spectral theory in the absence of ellipticity for high contrast photonic crystals," 8^{th} International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Bejing, China.

13. IMA Hot Topics Workshop: Hydraulic Fracturing from Modeling and Simulation to Reconstruction and Characterization, "Quasi-Brittle Free Crack Propagation Using Cohesive Dynamics," May 11–14, 2015.

14. "Design of heterogeneous structures for maximum specific strength and stiffness," 8^{th} International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Bejing, China.

15. "Cohesive dynamics and fracture," 8^{th} International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Bejing, China.

16. "Domain Decomposition and Multiscale Preconditioners for Heterogeneous Media,"8^{th} International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Bejing, China.

17. "Cohesive Dynamics and Fracture,"13^{th} National Congress on Computational Mechanics, July 26 - 30, 2015, San Diego, CA.

18. "Domain Decomposition and Multiscale Preconditioners for Heterogeneous Media,"13^{th} National Congress on Computational Mechanics, July 26 - 30, 2015, San Diego, CA.

19. "Design of Slow Wave Structures for High Power Oscillators and Amplifiers using Grounded Metamaterial Architectures," IEEE Pulsed Power Conference, May 31-June 4, 2015, Austin TX.

20. "Multi-Scale Strategy to Optimize Metamaterial Slow Wave Structure Design for Short Traveling Wave Tubes." Review: FY 12 AFOSR MURI on Transformational Electromagnetics, November 5, 2014, Arlington, VA.

21. "Dynamic Brittle Fracture as a Macroscopic Limit of Unstable Mesoscopic Dynamics: Theory and Computation," USACM workshop on Meshfree Methods for Large-Scale Computational Science and Engineering, October 27-28, 2014, Tampa, FL

22. "Dynamic Brittle Fracture as a Small Horizon Limit of Unstable Nonlocal Dynamics," Society for Engineering Science, October 1-3, 2014, Purdue University, West Lafayette, IN.

23. "Is Dynamic Fracture at the Macroscale a Distinguished Limit of Unstable Bond Models?" 2014 SIAM Annual Meeting, July 7-11, 2014, Palmer House, Chicago, IL.

24. "Dynamic Brittle Fracture as a Small Horizon Limit of Peridynamics," 2013 SIAM Conference on Analysis of Partial Differential Equations, Dec. 7 – 10, 2013, Hilton Orlando Lake Buena Vista Florida, Lake Buena Vista, FL.

25. "Peridynamics with Unstable Bonds and Dynamic Fracture in Brittle Materials," 50^{th} Society for Engineering Science Technical Meeting, July 28–31, 2013, Providence, RI.

26. "Identifying the Strongest Composites," SIAM Conference on Mathematical Aspects of Materials Science, June 9–12, 2013.

27. "Peridynamic Scaling and Dynamic Fracture in Brittle Materials," Thirteenth Pan-American Congress on Applied Mechanics, May 22–24, 2013, Houston, TX.

28. "Multiscale Analysis of Heterogeneous Media in the Peridynamic Formulation," Workshop on Nonlocal Damage and Failure: Peridynamics and Other Nonlocal Models March 11–12, 2013, San Antonio, Texas.

29. "Multiscale Analysis for Heterogeneous Peridynamic Media," Joint Mathematics Meetings American Mathematical Society, San Diego, CA., January 9–12, 2013.

30. "Mathematics of Dispersion in Electromagnetic Meta-Materials," Joint Mathematics Meetings American Mathematical Society, San Diego, CA., January 9–12, 2013.

31. "Multi-Scale Quasistatic Damage Evolution for Polycrystalline Materials," 49^{th} Society for Engineering Science Technical Meeting, October 10-12, 2012, Atlanta Georgia.

32. "An Exponentially Convergent Approximation Theory for Fields Inside Multiscale Heterogeneous Materials," 2012 SIAM Annual Meeting July 8–13, 2012 Minneapolis, MN.

33. "Multiscale Damage Evolution in Polycrystalline Materials," 2012 SIAM Annual Meeting July 8–13, 2012 Minneapolis, MN.

34. "Materials Genome: An Opportunity for Applied Mathematics and Computational Science," 2012 SIAM Annual Meeting July 8–13, 2012 Minneapolis, MN.

35. "Multiscale Dynamics For Heterogeneous Peridynamic Media ,"Workshop on Peridynamics, Dissipative Particle Dynamics, and the Mori-Zwanzig Formulation, April 10 & 11, 2012, Brown University.

36. Panel Member, "Hierarchical Materials: Opportunities and Challenges" Fall 2011 MRS Meeting, November 28 – December 2. Boston, MA.

37. "Quasi-static Damage Propagation Through A Multiscale Threshold Criterion," 48^{th} Annual Technical Conference of the Society of Engineering Sciences, Northwestern University, Evanston, Illinois, October 12–14, 2011.

38. "Optimal Local Basis Functions and Exponential Convergence for Multiscale GFEM," Meshfree Methods for Partial Differential Equations, Universitat Bonn, October 4–6, 2011.

39. "Tunable Double Negative Band Structure from Non-Magnetic Coated Rods," ICIAM 2011, July 18–22, 2011, Vancouver, BC.

40. "Representation Formulas for L^∞ Norms of Weakly Convergent Sequences of Gradient Fields in Homogenization," SIAM Conference on Mathematical and Computational Issues in the Geosciences, March 21–24, 2011.

41. "Dispersion Relations for Sub-wavelength Plasmonic Crystals & Meta Materials," Progress in Electromagnetics Research Symposium PIERS, July 2010, Cambridge, MA.

42. "Optimal Lower Bounds on the Local Stress Inside Thermoelastic Composites," 16^{th} US National Congress on Theoretical and Computational Mechanics, State College, PA, June 2010.

43. "Macroscopic Strength Domains for Statistically Defined Heterogeneous Media," 16^{th} US National Congress on Theoretical and Computational Mechanics, State College, PA, June 2010.

44. "Tight Bounds on Failure Surfaces for Random Elastic-Plastic Composites," SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, PA May 2010.

45. "Sub-Wavelength Plasmonic Crystals: Dispersion Relations and Effective Properties," SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, PA May 2010.

46. "Dispersion Relations for Subwavelength Plasmonic Crystals," 2010 Spring AMS Southeastern Sectional Meeting Lexington, KY March 2010.

47. " Multiscale Modeling for Heterogeneous Peridynamic Media," IAMCS Workshop on Computational and Mathematical Challenges in Material Science and Engineering, Texas A&M University, December 2–3, 2009.

48. "Multi-scale Analysis of Peridynamics for Composite Media," US National Congress on Computational Mechanics USNCCM-10, Columbus Ohio July 2009.

49. "A New Method for Design of Composite Structures for Strength and Stiffness," US National Congress on Computational Mechanics USNCCM-10, Columbus Ohio July 2009.

50. "Controlling dispersion relations of frequency dependent materials near resonance," Symposium on Optimal Design in Electromagnetics, Society for Industrial and Applied Mathematics (SIAM) Annual Meeting, Denver, July 6-10, 2009.

51. "A New Method for Design of Composite Structures for Strength and Stiffness," World Congress on Structural and Multidisciplinary Optimization, WCSMO-8 Lisbon Portugal, June 1–5, 2009.

52. Meshless Methods, Generalized Finite Element Methods, and Related Approaches, University of Maryland, College Park, Maryland, March 26–27, 2008.

53. 12^{th} AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Victoria, BC, September 10–12, 2008.

54. Materials Science Program Review, Dayton Ohio, July 30-31, 2008.

55. 2008 SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia Pennsylvania, May 11–14.

56. 6^{th} International Conference on Mechanics of Time Dependent Materials, Monterey, CA, March 30–April 4, 2008.

57. SIAM Conference on Analysis of Partial Differential Equations, Mesa, AZ, December, 10-12, 2007.

58. Society for Engineering Science 44^{th} Annual Technical Meeting, College Station Texas, October 21-24, 2007.

59. AFOSR Joint Program Review, Long Beach, CA, August 2007.

60. Challenges in Computer Simulations, National University of Singapore, July, 23-25, 2007.

61. 6th International Congress on Industrial and Applied Mathematics, Zurich, July 16-20, 2007.

62. DOE Multiscale Mathematics and High-Performance Computing Summer School, Oregon State University, July 1-3, 2007.

63. Workshop on Modeling, Analysis and Simulation of Multiscale Nonlinear Systems, Oregon State University, June 19-29, 2007.

64. ASME-ASCE-SES Mechanics of Materials Conference, Austin, TX, June 2007.

65. AMS Fall Central Section Meeting, University of Cincinnati, Cincinnati, OH, Oct. 2006.

66. AFOSR Joint Program Review, Atlanta Georgia, August 2006.

67. Seventh World Congress on Computational Mechanics, Los Angeles, CA, July 2006, Symposium on Mathematical and Computational Aspects of Multiscale and Multiphysics,
and Symposium on Computational Bridging of Length Scales.

68. SIAM Annual Meeting, Minysymposium on Microstructure and PDE, Boston, MA, July 2006.

69. PNNL Workshop Multiscale Modeling of Materials, Tacoma WA May 2006.

70. IUTAM symposium, TopoptSYMP2005, Rungstedgarrd, Copenhagen, Denmark, October 2005.

71. AFOSR Joint Program Review, Long Beach, California, August 2005.

72. 8^{th} U.S. National Congress on Computational Mechanics, Austin Texas, July 2005.

73. ASME-ASCE-SES Mechanics of Materials Conference, Baton Rouge, Louisiana, May 2005.

74. Society for Engineering Science 41st Annual Technical Meeting, Lincoln, Nebraska, October 2004.

75. Midnight Sun Conference - Multi Scale Problems and Asymptotic Analysis, Narvik Norway, June 2004.

76. 2004 AFOSR Program Review for Computational Mathematics and Applied Mathematics, Dayton, Ohio, June 2004.

77. SIAM Conference on Mathematical Aspects of Materials Science, Los Angeles, May 2004.

78. Conference on Computational Methods in Multiscale Analysis and Applications, University of Florida, March 2004.

79. American Mathematical Society South East Section Meeting, University of North Carolina, October 2003.

80. Society of Engineering Science, Annual Technical Meeting, University of Michigan, October 2003.

81. Society for Natural Philosophy Meeting, University of Kentucky, September 2003.

82. Seventh National US Congress on Computational Mechanics, Albuquerque, New Mexico, July 2003.

83. International Congress of Applied Mathematics, Sydney Australia, July 2003.

84. NATO Advanced Research Workshop on Nonlinear Homogenization and Applications, Kazimierz Dolny, Poland, July 2003.

85. 2003 American Society of Mechanical Engineers, Mechanics and Materials Conference, Scottsdale Arizona, June 2003.

86. 2003 AFOSR Program Review for Computational Mathematics and Applied Mathematics, University of Florida, May 2003.

87. American Mathematical Society South East Section Meeting, Louisiana State University, March 2003.

88. First Joint AMS UMI meeting Pisa Italy, June 2002.

89. 2002 AFOSR Program Review for Computational Mathematics and Applied Mathematics, University of Florida, May 2002.

90. IUTAM Symposium: "Micromechanics of Fluid Suspensions and Solid Composites", University of Texas, Austin, April, 2002.

91. American Mathematical Society South East Section Meeting, Georgia Institute of Technology, March 2002.

92. Materials Research Society Fall Meeting, November 2001.

93. AFOSR Contractors and Grantees Meeting, Stanford University July 2001

94. Progress in Electromagnetics Research Conference 2000. August 2000, Cambridge Massachusetts.

95. International Congress on Theoretical and Applied Mechanics, August 2000, Chicago, Il.

96. The American Society of Civil Engineers Fourteenth Engineering Mechanics Conference, Technical Session on Multi-scale Modeling of Composites, May 2000, The University of Texas at Austin, Austin, TX.

97. Third SIAM Conference on Mathematical Aspects of Materials Science, May 2000, Philadelphia, Pennsylvania.

98. The American Society of Civil Engineers Thirteenth Engineering Mechanics Conference, Technical Session on Characterizing Interfaces in Reinforced Concrete, May 1999, Johns Hopkins University, Baltimore, MD.

99. The U.S. National Congress of Applied Mechanics, Symposium on Size Effect and Scaling Laws, June 1998, University of Florida.

100. AFOSR International Conference on Computer-Aided Design of High-Temperature Materials, July 1997, Santa Fe, NM.

101. Joint ASME/ASCE/SES Summer Meeting, July 1997, Northwestern University, Evanston, IL.

102. Second SIAM Conference on Mathematical Aspects of Materials Science, May 1997, Philadelphia, Pennsylvania.

103. AMS Annual Meeting, January 1997, San Diego, California.

104. AFOSR Electromagnetics Conference , January 1997, San Antonio, Texas.

105. Workshop on Composite Materials with Multiple Scales, November 1996, Technical University of Denmark, Hillerod, Denmark.

106. AMS-IMS-SIAM Joint Summer Research Conference on Control Theory, June 1996, Mt Holyoke College, South Hadley, MA.

107. SES Technical Meeting November 1995, New Orleans, Louisiana.

108. AC Erigen Medal Workshop, SES Technical Meeting, September 1994, Texas A & M University, College Station, Texas.

109. Society of Photo-Optical Instrumentation Engineers 1994 North American Conference on Smart Structures and Materials, Orlando, Florida, February 1994.

110. NATO Advanced Workshop on Homogenization Theory, Trieste, Italy, September 1993.

111. Conference Board of Mathematical Sciences workshop on Compensated Compactness Homogenization and H-Measures, Santa Cruz, California, June 1993.

112. Society for Industrial and Applied Mathematics Annual Meeting; Mini symposium on Optimization, Philadelphia, Pennsylvania, July 1993.

113. American Society of Mechanical Engineers, Engineering Mechanics Division 30th Annual Technical Meeting, Charlottesville, Virginia, June 1993.

114. Society of Photo-Optical Instrumentation Engineers 1993, North American Conference on Smart Structures and Materials, Albuquerque, New Mexico, February 1993.

115. IUTAM Symposium on Optimal Design with Advanced Materials, Lyngby, Denmark, August 1992.

116. NATO Advanced Research Workshop, Topology Design of Structures, Sesimbra Portugal, June 1992.

117. "Composites with Optimal Stiffness Properties," RISO Government Laboratories, Roskilde, Denmark, Summer, 1991.

118. "Bounds and Perturbation Theory for Transversely Isotropic Composites," Euromech Conference on Random Particulate Composites, Schumen, Bulgaria, June, 1991.

119. "New Bounds for Transversely Isotropic Composites," NATO Advanced Workshop on Homogenization Theory, Trieste, Italy, January, 1990.

120. "On Composites with Crystallographic Symmetry," SIAM Conference on Mathematical and Computational Issues in Geophysical Fluid and Solid Mechanics, Houston, Texas, September, 1989.

121. "Composites with Symmetry," Workshop on Mathematical Analysis of Material Microstructure, Cornell University, Ithaca, New York, June, 1988.

122. "Optimal Bounds for Incompressible Elastic Composites," Fifth Army Conference on Applied Mathematics and Computing, West Point, New York, June, 1987.

123. "Solution of the G-closure Problem for Incompressible 2-d Elastic Composites," Nonlinear Partial Differential Equations, Brigham Young University, Provo, Utah, March, 1987.

124. "Minimum Energy Dissipation for Stokes Flow," SIAM Workshop on Multiphase Flow, Leesburg, Virginia, June, 1986.