Christopher J. Larsen

Department of Mathematical Sciences
Worcester Polytechnic Institute
Worcester, MA 01609

Phone: (508) 831-6124
email: cjlarsen@wpi.edu
webpage

Education:

Ph.D., Mathematics, Carnegie Mellon University, 1996

M.S., Applied Mathematics, Carnegie Mellon University, 1994

J.D., University of Maryland School of Law, 1992

B.S., Physics, Carnegie Mellon University, 1989

Appointments:

Fall, 2019:	Visiting Scholar in Engineering, Brown University
2015-2017:	Associate Department Head, Department of Mathematical Sciences, Worcester Polytechnic Institute
2013-present:	Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute
January-June 2006:	Visiting Associate in Mechanical Engineering, California Institute of Technology
2004-2013	Associate Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute
March/May 2003:	Invited Professor, University of Paris-Dauphine
May 2002:	Invited Professor, University of Paris-Nord
Sept/Oct 2001:	Invited Professor, University of Paris-Dauphine
May 2001:	Invited Professor, University of Paris-Nord
1999-2004:	Assistant Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute
1996-1999:	Visiting Assistant Professor, Department of Mathematical Sciences, Worcester Polytechnic Institute

Research Funding:

PI:

- NSF: "Variational fracture with loads." 2022 - 2025. Awarded Amount: $271,932
- NSF: "New mathematical methods for dynamic fracture evolution." 2019 - 2022. Awarded Amount: $250,000
- NSF: "New mathematical methods for fracture evolution." 2016 - 2020. Awarded Amount: $345,339
- NSF: "New variational methods for quasi-static and dynamic material defect evolution." 2013 - 2016. Awarded Amount: $343,991
- NSF: "Variational methods for material defect evolution." 2010 - 2013. Awarded Amount: $167,534
- NSF: "Damage and fracture evolution." 2008 - 2011. Awarded Amount: $162,228
- NSF: "Variational methods for material damage: fracture, fatigue, and debonding." 2005 - 2008. Awarded Amount: $240,450

Additional support:

- ERC Advanced Grant: "Quasistatic and Dynamic Evolution Problems in Plasticity and Fracture" (Team Member; PI: G. Dal Maso). 2012 - 2017. Amount: €968,500

Honors:

Leverhulme Visiting Professor, University of Bristol

Graduate Students:

Ph.D.:

- Andrey Martemyanov, Ph.D. expected 2029.
- Pooya Yousefi, Ph.D. 2023: "Quasi-static Griffith Fracture Evolution with Boundary Loads." Winner, Department Best Dissertation Award. First position: Postdoc, McMaster University
- Yiqing Li, Ph.D. 2016: "Quasi-static Fracture Evolution with Cohesive Energy." Winner, Department Graduate Research Award. First position: Industry
- Casey L. Richardson, Ph.D. 2008: "Some Problems in the Mathematics of Fracture: Paths from Front Kinetics and a Level Set Method." First position: CAM Assistant Professor, UCLA

Masters:

David Evans, M.S. 2011

Publications:

1. O. Lopez-Pamies, J. E. Dolbow, G. A. Francfort, and C. J. Larsen, Classical variational phase-field models cannot predict fracture nucleation, *Comput. Methods Appl. Mech. Engrg.* **433** (2025), 117520.

2. C. J. Larsen, A local variational principle for fracture, *J. Mech. Phys. Solids* **187** (2024), 105625.

3. C. J. Larsen, J. E. Dolbow, and O. Lopez-Pamies, A variational formulation of Griffith phase-field fracture with material strength, *Int. J. Fract.* (2024), doi:10.1007/s10704-024-00786-3.

4. K. Vijaykumar, B. E. Grossman-Ponemon, P. Yousefi, Y. Wan, C. J. Larsen, H. Kesari, A regularized variational mechanics theory for modeling the evolution of crack networks in composite materials with brittle interfaces, *J. Mech. Phys. Solids* **193** (2024), 105772.

5. C. J. Larsen, Variational phase-field fracture with controlled nucleation, *Mech. Res. Commun.* **128** (2023), 104059.

6. C. J. Larsen, Variational fracture with boundary loads, *Appl. Math. Lett.* **121** (2021), 107437.

7. A. Garroni, C. J. Larsen, and D. Sarrocco, Damage dynamics: a variational approach, *Rendiconti di Matematica* **41** (2020), pp. 275-299.

8. G. Dal Maso, C. J. Larsen, and R. Toader, Elastodynamic Griffith fracture on prescribed crack paths with kinks, *Nonlinear Differential Equations and Applications* **27** (1) (2020), pp. 1-26.

9. G. Dal Maso, C. J. Larsen, and R. Toader, Existence for elastodynamic Griffith fracture with a weak maximal dissipation condition, *J. Math. Pures et Appliquées* **127** (2019), pp. 160-191.

10. G. Dal Maso, C. J. Larsen, and R. Toader, Existence for constrained dynamic Griffith fracture with a weak maximal dissipation condition, *J. Mech. Phys. Solids* **95** (2016), pp. 697-707.

11. I. Chenchiah and C. J. Larsen, Quasi-static brittle damage evolution in elastic materials with multiple damaged states, *Arch. Ration. Mech. Anal.* **215** (2015), pp. 831-866.

12. C. J. Larsen, A new variational principle for cohesive fracture and elastoplasticity, *Mech. Res. Commun.* **58** (2014), pp. 133-138.

13. C. J. Larsen and V. Slastikov, Dynamic cohesive fracture: models and analysis, *Math. Models Methods Appl. Sci.* **24** (2014), pp. 1857-1875.

14. C. J. Larsen, Local minimality and crack prediction in quasi-static Griffith fracture evolution, *Discrete Contin. Dyn. Syst. Series S* **6** (2013), pp. 121-129.

15. G. Dal Maso and C. J. Larsen, Existence for wave equations on domains with arbitrary growing cracks, *Rend. Lincei Mat. Appl.* **22** (2011), pp. 387-408.

16. B. Bourdin, C. J. Larsen, and C. L. Richardson, A time-discrete model for dynamic fracture based on crack regularization, *Int. J. Fract.* **168** (2011), pp. 133-143.

17. A. Braides and C. J. Larsen, Γ-convergence for stable states and local minimizers, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (5)* **X** (2011), pp. 193-206.

18. H. Jiang, C. J. Larsen, and L. Silvestre, Full regularity of a free boundary problem with two phases, *Calc. Var. Partial Differential Equations* **42** (2011), pp. 301-321.

19. C. J. Larsen, Epsilon-stable quasi-static brittle fracture evolution, *Comm. Pure Appl. Math.* **63** (2010), pp. 630-654.

20. C. J. Larsen, C. Ortner, and E. Süli, Existence of solutions to a regularized model of dynamic fracture, *Math. Models Methods Appl. Sci.* **20** (2010), pp. 1021-1048.

21. C. J. Larsen, *Models for dynamic fracture based on Griffith's criterion*, in IUTAM Symposium on Variational Concepts with Applications to the Mechanics of Materials (Klaus Hackl, ed.), Springer, 2010, pp. 131-140.

22. A. Garroni and C. J. Larsen, Threshold-based quasi-static brittle damage evolution, *Arch. Ration. Mech. Anal.* **194** (2009), pp. 585-609.

23. C. J. Larsen, M. Ortiz, and C. L. Richardson, Fracture paths from front kinetics: relaxation and rate-independence, *Arch. Ration. Mech. Anal.* **193** (2009), pp. 539-583.

24. C. J. Larsen, C. L. Richardson, and M. Sarkis, A level set method for the Mumford-Shah functional and fracture, *Technical Report Serie A* 581 (2008), Instituto de Matematica Pura e Aplicada, Brazil.

25. H. Jiang and C. J. Larsen, Analyticity for a two dimensional free boundary problem with volume constraint (2006) (preprint)

26. G. A. Francfort and C. J. Larsen, Existence and convergence for quasi-static evolution in brittle fracture, *Comm. Pure Appl. Math.* **56** (2003), pp. 1465-1500.

27. A. Chambolle and C. J. Larsen, C^∞ regularity of the free boundary for a two-dimensional optimal compliance problem, *Calc. Var. Partial Differential Equations* **18** (2003), pp. 77-94.

28. C. J. Larsen, Regularity of components in optimal design problems with perimeter penalization, *Calc. Var. Partial Differential Equations* **16** (2003), pp. 17-29.

29. C. J. Larsen, Regularity in two-dimensional variational problems with perimeter penalties, *C. R. Acad. Sci. Paris Sér. I Math.* **333** (2001), pp. 261-266.

30. C. J. Larsen and R. Lui, Uniqueness of steady-states and asymptotic behavior of solutions of a liquid junction model with insulation, *Nonlinear Anal. Real World Appl.* **3** (2002), pp. 227-241.

31. C. J. Larsen, On the representation of effective energy densities, *ESAIM Control Optim. Calc. Var.* **5** (2000), pp. 529-538.

32. C. J. Larsen, Distance between components in optimal design problems with perimeter penalization, *Ann. Scuola Norm. Sup. Pisa Cl. Sci.* **28** (1999), pp. 641-649.

33. C. J. Larsen, A new proof of regularity for two-shaded image segmentations, *Manuscripta Math.* **96** (1998), pp. 247-262.

34. C. J. Larsen, Quasiconvexification in $W^{1,1}$ and optimal jump microstructure in BV relaxation, *SIAM J. Math. Anal.* **29** (1998), pp. 823-848.

Invited Short Courses:

- Three week course on "Variational methods in materials science," Park City Mathematics Institute - Institute for Advanced Study, June-July 2014
- One week mini-course on "Mathematical issues in globally minimizing, locally minimizing, and dynamic fracture evolutions" in *Evolution Problems in Fracture Mechanics*, SISSA, Italy, March 2013
- "A Guide to SBV and applications," University of Oxford, May 2009
- "A Guide to SBV and applications," Caltech, January-March 2006

Invited Conference Presentations as a Primary Speaker:

1. IUTAM Symposium "Computational Fracture Mechanics in Multi-field Problems" (celebrating the 70th birthday of Michael Ortiz), Siegen, Germany, December 2024
2. Oberwolfach workshop on Fracture as an Emergent Phenomenon, January 2024
3. Calculus of Variations and Applications: A Conference in Honor of Gianni Dal Maso, SISSA, Italy, January 2020
4. Banff Workshop on Phase-field Models of Fracture, March 2019
5. Workshop "Working Group on Multiscale Strategies," IMA, August 2017
6. Conference on "Calculus of Variations and PDE," UC Berkeley, May 2017
7. Miniworkshop on "Dislocations, Plasticity, and Fracture," SISSA, Italy, February 2017
8. ("Selected Lecture") International Workshop on "Multiscale Innovative Materials and Structures," Salerno, Italy, October 2016
9. Workshop on "Quasistatic and Dynamic Evolution Problems in Plasticity and Fracture," Trieste, Italy, June 2016
10. Lorentz Center workshop "Microstructure evolution in materials: defects, cracks & interfaces," Leiden, Netherlands, April 2016
11. IUTAM Symposium "Innovative numerical approaches for materials and structures in multi-field and multi-scale problems" (dedicated to the 60th birthday of Michael Ortiz), Attendorn, Germany, September 2014
12. PIRE Workshop on Evolution Problems for Material Defects: Dislocations, Plasticity, and Fracture, Trieste, Italy, September-October 2013

13. ("Selected Lecture") Workshop on Multi-scale Modeling and Characterization of Innovative Materials and Structures, Salerno, Italy, May 2013
14. Computational Methods for Multiscale Modeling of Materials Defects, IPAM, UCLA, December 2012
15. International Conference on Variational Problems with Multiple Scales, Otranto, Italy, June 2012
16. Oberwolfach workshop on Variational Methods for Evolution, December 2011
17. (Keynote) International Workshop on Phase Separation, Damage and Fracture, WIAS Berlin, September 2011
18. Banff workshop on Rate-independent systems: Modeling, Analysis, and Computations, August 2010 (video)
19. Oberwolfach workshop on Microstructures in Solids: From Quantum Models to Continua, March 2010
20. IUTAM Symposium "Variational Concepts with Applications to the Mechanics of Materials," Bochum, Germany, September 2008
21. Oxford Workshop on Fracture, Oxford, England, March 2008
22. (Plenary) ICM2006 Satellite Conference "New Trends and Challenges in the Calculus of Variations and its Applications," Toledo, Spain, August 2006
23. Workshop on Rate-Independent Processes, Paris, France, August 2004
24. Workshop on Calculus of Variations, Savoie, France, June 2003

Other Invited Conferences:

1. (Keynote) 16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics, minisymposium on "Phase-field models of fracture," Vancouver, July 2024
2. (Keynote) 9th European Congress on Computational Methods in Applied Sciences and Engineering, minisymposium on "Advances in Computational Techniques for Fracture," Lisbon, Portugal, June 2024
3. (Keynote) Society of Engineering Science Annual Meeting, special session on Phase-field Models of Fracture for Solids, Hard and Soft, Minneapolis, October 2023
4. (Keynote) Seventh International Conference on Computational Modeling of Fracture and Failure of Materials and Structures, mini-symposium on Theory of Fracture, Crack Propagation Criteria, and Crack Tracking Algorithms, Prague, Czech Republic, June 2023
5. (Keynote) International Conference on Plasticity, Damage, and Fracture, Punta Cana, Dominican Republic, January 2023
6. International Workshop on "Multiscale Innovative Materials and Structures," Salerno, Italy, September/October 2022

7. Society of Engineering Science Annual Meeting, Special Session on Variational And Phase-Field Models of Fracture, virtual, September-October 2020

8. (Keynote) International Conference on Plasticity, Damage, and Fracture, Playa Del Carmen, Mexico, January 2020

9. (Keynote) Sixth International Conference on Computational Modeling of Fracture and Failure of Materials and Structures, Invited Session on Regularized Failure Models, Braunschweig, June 2019

10. (Keynote) International Conference on Plasticity, Damage, and Fracture, San Juan, PR, January 2018

11. International Conference on Plasticity, Damage, and Fracture, Puerto Vallarta, Mexico, January 2017

12. International Congress of Theoretical and Applied Mechanics, thematic session on Fracture Mechanics, Montreal, August 2016

13. International Congress on Industrial and Applied Mathematics, minisymposium on New Developments in Fracture Mechanics, Beijing, August 2015

14. (Keynote) Fourth International Conference on Computational Modeling of Fracture and Failure of Materials and Structures, mini-symposium on Theory of Fracture, Crack Propagation Criteria, and Crack Tracking Algorithms, Paris, June 2015

15. SIAM Conference on Mathematical Aspects of Materials Science, Special Session on Aspects of Homogenization: Analysis and Applications in Materials Science and Biophysics, Philadelphia, PA, June 2013

16. Joint Mathematics Meetings, AMS Special Session on Recent Advances and New Challenges in Applied Analysis, San Diego, CA, January 2013

17. International Congress on Industrial and Applied Mathematics, minisymposium on Modern Methods and Applications of the Calculus of Variations: Fracture Mechanics and Plasticity, Vancouver, July 2011

18. International Congress on Industrial and Applied Mathematics, minisymposium on Multiscale Phenomena in Calculus of Variations and Inverse Problems, Vancouver, July 2011

19. SIAM Conference on Mathematical Aspects of Materials Science, Special Session on New Frontiers in Calculus of Variations and Applications to Materials Science, Philadelphia, PA, May 2010

20. SIAM Conference on Analysis of Partial Differential Equations, Special Session on Variational Methods in Materials Science, Miami, Florida, December 2009

21. SIAM Conference on Mathematical Aspects of Materials Science, Special Session on Variational Models for Advanced Materials, Philadelphia, PA, May 2008

22. SIAM Conference on Analysis of Partial Differential Equations, Special Session on Free Boundary Problems And Beyond, Mesa, Arizona, December 2007

23. SIAM Conference on Analysis of Partial Differential Equations, Special Session on Gradient Fields, Stresses, and Free Surfaces in Heterogeneous Materials, Mesa, Arizona, December 2007

24. Society of Engineering Science Annual Meeting, Special Session on Transport Properties of Micro-structured Media and Composite Materials, College Station, Texas, October 2007

25. International Congress on Industrial and Applied Mathematics, minisymposium on Mathematical Modeling and Numerical Analysis of Fracture Phenomena, Zurich, July 2007

26. International Congress on Industrial and Applied Mathematics, minisymposium on Mathematical Aspects of Materials Science: Plasticity and Fracture, Zurich, July 2007

27. Joint Mathematics Meetings, AMS Special Session on Calculus of Variations and Nonlinear PDE: Theory and Applications, New Orleans, LA, January 2007

28. AMS Sectional Meeting, Special Session on Nonconvex Variational Problems: Recent Advances and Applications, University of Utah, October 2006

29. SIAM Meeting on Analysis of Partial Differential Equations, Special Session on Contemporary Developments in Calculus of Variations and PDE, Boston, MA, July 2006

30. IX Conference on Partial Differential Equations, IMPA, Brazil, July 2005

31. First SIAM Meeting on Analysis of Partial Differential Equations, Special Session on Calculus of Variations, PDE and Mass Transport, Houston, TX, December 2004

32. First Joint Meeting of the AMS-UMI, Special Session on Contemporary Developments in Partial Differential Equations and in the Calculus of Variations, Pisa, Italy, June 2002

33. Nonlinear Analysis 2000$\rightarrow$, Courant Institute, May 2000

34. SIAM conference on Mathematical Aspects of Materials Science, Special Session on Optimal Design of Structures and Microstructures, Philadelphia, May 2000

35. Workshop on Structured Deformations, Carnegie Mellon University, January 1999

36. Canadian Applied Mathematics Society meeting, Simon Fraser University, May 1998

37. AMS Sectional Meeting, Special Session on Recent Developments in PDE's, Calculus of Variations, and Applications to Problems in Materials Science, Georgia Tech, October 1997

Conferences Organized:

1. Workshop on New Challenges for the Calculus of Variations Stemming From Problems in the Materials Sciences and Image Processing in Honour of the 60th Birthday of Irene Fonseca, May 2016 (organized with R. Choksi, N. Fusco, and G. Leoni)

2. Banff Workshop on Variational Models of Fracture, May 2016 (organized with B. Bourdin, G. Francfort, and C. Maurini)

3. 48th Annual Technical Meeting of Society of Engineering Sciences, Symposium on Defect Evolution in Materials, Evanston, IL, October 2011

4. Oberwolfach mini-workshop on Mathematical Models, Analysis, and Numerical Methods for Dynamic Fracture (organized with G. Dal Maso and C. Ortner), April 2011
5. AMS Sectional Meeting, Special Session on Quasi-static and Dynamic Evolution in Fracture Mechanics, Worcester, MA, April 2009
6. SIAM Conference on Mathematical Aspects of Materials Science, four Special Sessions on Damage and Fracture Evolution (invited, organized with G. Dal Maso, G. Francfort, and A. Garroni), Philadelphia, PA, May 2008
7. Workshop on Free Discontinuity Problems: From Image Processing to Materials Science (organized with B. Bourdin), Baton Rouge, LA, January 2007
8. Joint Mathematics Meetings, AMS Special Session on Free Discontinuity Problems: From Image Processing to Materials Science (organized with B. Bourdin), New Orleans, LA, January 2007
9. First SIAM Meeting on Analysis of Partial Differential Equations, Special Session on Free Boundary Problems and Optimal Transportation (organized with R. Jerrard), Houston, TX, December 2004

Invited Seminars:

1. Analysis Seminar, SISSA, Trieste Italy, June 2019
2. Solid Mechanics Seminar, Brown University, October 2018
3. Analysis Seminar, SISSA, Trieste Italy, April 2018
4. Center for Nonlinear Analysis Seminar, Carnegie Mellon, April 2017
5. Mathematics Colloquium, University of Pittsburgh, November 2015
6. PDE/Applied Math Seminar, Drexel University, February 2015
7. PDE/Differential Geometry Seminar, University of Connecticut, October 2013
8. Applied Analysis & Computation Seminar, University of Massachusetts-Amherst, September 2013
9. Analysis Seminar, Temple University, September 2013
10. Analysis Seminar, SISSA, Trieste Italy, June 2012
11. Analysis Seminar, University of Rome "La Sapienza", October 2011
12. Analysis and Applied Math Seminar, University of Toronto, February 2011
13. Applied and Computational Mathematics Seminar, Georgia Tech, October 2010
14. Centre for Nonlinear Mechanics Seminar, University of Bath, May 2009
15. PDE Seminar, Brown University, April 2009
16. Analysis Seminar, University of Bristol, November 2008

17. OxPDE Seminar, University of Oxford, November 2008
18. Analysis Seminar, SISSA, Trieste Italy, October 2008
19. Applied Math Seminar, University of Glasgow, March 2008
20. CMAP Seminar, Ecole Polytechnique, Paris, February 2008
21. Applied Math Seminar, Temple University, February 2007
22. Mathematical Physics Seminar, Caltech, May 2006
23. Analysis Seminar, SISSA, Trieste Italy, May 2006
24. Applied Math Seminar, UC Irvine, March 2006
25. Mathematics Colloquium, Louisiana State University, March 2006
26. Differential Equations Seminar, University of Rome "La Sapienza", November 2005
27. Numerical Analysis Seminar, Ecole Polytechnique, Paris, November 2005
28. Applied Analysis Seminar, Weierstrass Institute, Berlin, November 2005
29. Analysis Seminar, University of Warwick, October 2005
30. Center for Nonlinear Analysis Seminar, Carnegie Mellon University, March 2005
31. Partial Differential Equations Seminar, IMPA, Brazil, May 2004
32. Calculus of Variations Seminar, University of Paris-Dauphine, March 2003
33. Computer Science Research Institute Seminar, Sandia National Laboratories, October 2002
34. Harmonic Analysis Seminar, University of Paris-Sud, June 2002
35. Partial Differential Equations Seminar, University of Savoie, May 2002
36. Homogenization and Multiple Scales Seminar, University of Paris VI, May 2002
37. Calculus of Variations Seminar, University of Paris-Dauphine, March 2002
38. Applied and Computational Mathematics Seminar, Caltech, February 2002
39. Center for Nonlinear Analysis Seminar, Carnegie Mellon University, January 2002
40. Applied Mechanics Seminar, Caltech, October 2001
41. Computer Science Research Institute Seminar, Sandia National Laboratories, September 2001
42. Seminar of the Laboratoire Jacques-Louis Lions, University of Paris VI, May 2001
43. Applied Analysis and Computation Seminar, University of Massachusetts-Amherst, March 2001
44. Center for Nonlinear Analysis Seminar, Carnegie Mellon University, April 2000
45. Applied and Computational Mathematics Seminar, Penn State University, April 2000

46. Image Science Seminar, Computer Science Department, WPI, November 1999
47. Harmonic Analysis Seminar, University of Paris-Sud, March 1999
48. Differential Equations Seminar, North Carolina State University, December 1998
49. Stochastic and Nonlinear Analysis Seminar, University of Illinois at Urbana-Champaign, September 1998
50. Differential Equations Seminar, University of Connecticut, September 1997
51. Mathematics Colloquium, WPI, September 1996
52. Mathematics Colloquium, University of Missouri-Rolla, February 1996

Invitations:

1. SISSA, Trieste, Italy, May 2024, one week
2. McMaster University, May 2024, one week
3. SISSA, Trieste, Italy, June 2019, one week
4. SISSA, Trieste, Italy, April 2018, one week
5. IMA, University of Minnesota, August 2017, one week
6. University of Paris-Nord, June 2017, one week
7. SISSA, Trieste, Italy, February 2017, two weeks
8. SISSA, Trieste, Italy, March 2013, one week
9. IPAM (UCLA) program on "Materials Defects: Mathematics, Computation, and Engineering," invited "long term core participant," fall 2012
10. SISSA, Trieste, Italy, June 2012, one week
11. Carnegie Mellon University, May 2012, one week
12. University of Rome, November 2011, one week
13. Caltech, January 2011, one week
14. University of Bonn, Germany, March 2010, three days
15. University of Oxford, May 2009, one week
16. Louisiana State University, LA, January 2009, four days
17. University of Oxford, November 2008, one month
18. University of Rome, October 2008, one week
19. SISSA, Trieste, Italy, October 2008, one week

20. University of Oxford, March 2008, one week
21. University of Rome, February 2008, two weeks
22. Ecole Polytechnique, Paris, February 2008, two weeks
23. Louisiana State University, LA, January 2008, one week
24. SISSA, Trieste, Italy, July 2007, one week
25. University of Rome, March 2007, one week
26. Caltech Department of Aerospace Engineering, January 2007, one week
27. SISSA, Trieste, Italy, May 2006, one week
28. University of Rome, February 2006, two weeks
29. University of Rome, November 2005, one week
30. Ecole Polytechnique, Paris, December 2005, three days
31. Weierstrass Institute, Berlin, November 2005, one week
32. University of Paris-Nord, October 2005, one week
33. University of Warwick, England, August 2005, three months
34. IMPA, Brazil, July 2005, one month
35. IMA, University of Minnesota, June 2005, one week
36. Carnegie Mellon University, PA, March 2005, one week
37. IMA, University of Minnesota, October-November 2004, two weeks
38. IMPA, Brazil, May 2004, one week
39. University of Bonn, Germany, June 2003, one week
40. Sandia National Laboratories, NM, October 2002, one week
41. University of Savoie, France, May 2002, three days
42. Carnegie Mellon University, PA, January 2002, two weeks
43. Caltech Department of Applied Mechanics, CA, October 2001, two weeks
44. University of Paris-Dauphine, France, September-October 2001, two weeks
45. Sandia National Laboratories, NM, September 2001, one week
46. University of Bonn, Germany, June 2001, one week
47. Caltech Department of Applied Mechanics, CA, April 2001, two days
48. Carnegie Mellon University, PA, April 2000, one week

49. Penn State University, PA, April 2000, one week
50. Carnegie Mellon University, PA, May 1999, one week
51. University of Paris-Sud, France, March 1999, one week
52. Carnegie Mellon University, PA, January 1999, one week
53. North Carolina State University, NC, December 1998, four days
54. Simon Fraser University, Canada, May 1998, one week

Refereeing:

Communications on Pure and Applied Mathematics
Archive for Rational Mechanics and Analysis
Calculus of Variations and Partial Differential Equations
SIAM Journal on Mathematical Analysis
SIAM Journal on Numerical Analysis
SIAM Journal on Applied Mathematics
Annali della Scuola Normale Superiore di Pisa Classe di Scienze
International Journal of Fracture
Journal of Differential Equations
Journal of Elasticity
Proceedings of the Royal Society A
Journal of Nonlinear Science
The Royal Society of Edinburgh Proceedings A (Mathematics)
Mathematical Models and Methods in Applied Sciences
Mathematical Modelling and Numerical Analysis
ESAIM: Control, Optimisation and Calculus of Variations
Interfaces and Free Boundaries
Applied Mathematics Research Express
Applied Mathematics and Optimization
Journal of Mathematical Analysis and Applications
Computer Methods in Applied Mechanics and Engineering
Optimization

Ph.D. Thesis Referee, Functional Analysis and Applications Sector, SISSA

Ph.D. Thesis Committee, Carnegie Mellon University

Ph.D. Thesis Committee, Mechanical Engineering, WPI

Reviewer for Austrian Science Fund

Reviewer for Swiss National Science Foundation

NSF panelist, Division of Mathematical Sciences, Materials and Continuum Mechanics Panels

NSF reviewer, Division of Materials Research

Courses Developed:

- Introduction to Analysis I - IV, a Freshman sequence as an alternative to the Calculus sequence, for motivated Freshmen (with B. Vernescu)
- Graduate Topics course on Partial Differential Equations
- Undergraduate Topics course on Mathematics of Quantum Mechanics
- Undergraduate Topics course on Topology

Undergraduate Projects:

- Crack branching in phase-field dynamic fracture
- Construction of Stable States for Cohesive Fracture and Elastoplasticity
- Crack Derivatives
- Stable Convergence of the Ambrosio-Tortorelli Functionals
- Continuity of Crack Sets in Dynamic Fracture
- SBV Compactness
- Weak Topologies and Metrizability (runner-up, Provost's award)
- Interdisciplinary Project: Coalitions in the U.S. Supreme Court
- Interaction of Gravity and Electromagnetic Waves
- Heat Flow in Porous Media, co-advised with B. Vernescu (runner-up, Provost's award)
- Interdisciplinary Project: Civil Standards and Justice
- Notions of Size for Infinite Sets and Applications (winner, Provost's award)
- Two Projects for WPI's Industrial Math REU program