# Blaise Bourdin

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## Employment

**McMaster University, Hamilton, ON, Canada**

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| Canada Research Chair in Mathematical and Computational Aspects of Solid Mechanics (tier 1) | July 2022 | present |
| Professor of Mathematics | July 2021 | present |

**Louisiana State University, Baton Rouge, LA, USA**

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| A.K. & Shirley Barton Professor of Mathematics | July 2019 | Aug. 2021 |
| Adjunct Professor of Mechanical Engineering | Sept. 2019 | present |
| Professor of Mathematics | Sept. 2014 | June 2019 |
| Adjunct faculty of the Center for Computation & Technology | May 2009 | present |
| Associate Professor of Mathematics | Sept. 2008 | Aug. 2014 |
| Faculty in residence of the Center for Computation & Technology | | Fall 2005 |
| Assistant Professor of Mathematics | Sept. 2002 | Aug. 2008 |

**Université Pierre et Marie Curie, Paris, France**

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| Visiting Professor of Mechanics, Institut Jean le Rond d'Alembert | | June 2011 |

**California Institute of Technology, Pasadena, CA**

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| Visiting Associate Professor of Mechanical Engineering | Jan. | June 2010 |
| Postdoc, Department of Mechanical Engineering<br>Mentor: K. Bhattacharya | Jan. | Jul. 2000 |

**New York University**

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| Postdoc, Courant Institute for Mathematical Science<br>Mentor: R. V. Kohn | Sept. 2000 | Aug. 2002 |

**Technical University of Denmark, Lyngby, Denmark**

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| Postdoc, Danish Center for Applied Mathematics and Mechanics<br>Mentor: M. P. Bendsøe | Sept. 1998 | Dec. 1999 |

## Education

Ph. D. in Applied Mathematics, with highest honours, Université Paris 13, France — Dec. 1998
"*A Variational Approach for Brittle Fracture: Theory and Applications*"
Advisor: Prof G. A. Francfort

Diplôme d'Études Approfondies in Numerical Analysis, with honors, Université Paris 13, — June 1995

Maîtrise in Applied Mathematics with honors, Université Paris 13 — June 1994

License in Mathematics, Université Paris 13 — June 1993

DEUG in Science, Structures, and Materials, Université Paris 13 — June 1992

## Publications

*Over 10,000 citations on Google Scholar*

**Patent:**

M. Z. Hossain, C.-J. Hsueh, K. Bhattacharya, G. Ravichandran, and B. Bourdin, "Systems and Methods for Determining the Effective Toughness of a Material and for Implementing Materials Possessing Improved Effective Toughness Characteristics". U. S. Patent No: US 10,190,955, Jan. 29, 2019.

**Books:**

B. Bourdin, G.A. Francfort, and J.-J. Marigo, "*The variational approach to fracture*", Springer, 2008 (reprinted from *J. Elasticity* **91** (1-3), 2008, p. 5-148).

**Articles, book chapters, and conference proceedings:**

J. Shabani, K. Bhattacharya and B. Bourdin, "Systematic design of compliant morphing structures: a phase-field approach", to appear in *Appl. Math. Optim.*, 2024.

F. Marazzato and B. Bourdin, "A DG/CR discretization for the variational phase-field approach to fracture", *Comp. Mech*., **72**, p. 693 705, 2023.

K. Yoshioka, Y. Zhang, G. Lu, A. Bunger, J. Adachi, and B. Bourdin, "Improving the Accuracy of Fracture Toughness measurement in Burst Experiments", *Rock. Mech. Rock. Eng.,* **56**, p. 427 436, 2023. 5 citations

N. Van Tran and B. Bourdin, "Minimum compliance with obstacle constraints: an active set approach", *Struct. Multidiscip. O.*, **65** (4), p. 112, 2022. 1 citation

A. Akerson, B. Bourdin, and K. Bhattacharya, "Optimal Design of Responsive Structures", *Struct. Multidiscip. O.*, **65** (4), 2022. 4 citations

E. Tanné, B. Bourdin, and K. Yoshioka, "On the loss of symmetry in toughness dominated hydraulic fractures", *Int. J. Fracture*, **237** p. 189-202, 2022. 8 citations.

N. Brodnik, S. Brach, C. Long, G. Ravichandran, B. Bourdin, K. T Faber, and K. Bhattacharya, "Fracture diodes: directional asymmetry of fracture toughness", *Phys. Rev. Letters*, 126:025503, 2021. 26 citations. **Highlighted in Nature and Physics.**

A. Kumar, B. Bourdin, G. A. Francfort, and O. Lopez-Pamies, "Revisiting nucleation in the phase-field approach to brittle fracture". *J. Mech. Phys. Solids*, **142**, 2020, p.104027. 151 citations.

N. Brodnik, C.-J. Hsueh, K. T. Faber, B. Bourdin, G. Ravichandran, and K. Bhattacharya, "Guiding and trapping cracks with compliant inclusions for enhancing toughness of brittle composite materials". *J. Appl. Mech.*, **87** (3), 2020. 19 citations.

A. Dunkel, B. Bourdin, and S. R. Brandt, "vDef-Web: A case-study on building a science gateway around a research code". Proceedings of the Gateways 2019 conference San Diego, CA, USA, September 23-25 2019.

S. Brach, M.Z. Hossain, B. Bourdin, and K. Bhattacharya , "Anisotropy of the effective toughness of layered media". *J. Mech. Phys. Solids*, **131**, 2019, p. 96 111. 39 citations.

C. Chukwudozie, B. Bourdin, and K. Yoshioka, "A variational phase-field model for hydraulic fracturing in porous media". *Comp. Meth. Appl. Mech. Engng.*, **347**, 957 982, 2019. 160 citations.

S. Brach, E. Tanné, B. Bourdin, and K. Bhattacharya, "Phase-field study of crack nucleation and propagation in elastic-perfectly plastic bodies". *Comp. Meth. Appl. Mech. Engng*. **353** (15), 2019, p. 44 65. 30 citations.

C.-J. Hsueh, L. Avellar, B. Bourdin, G. Ravichandran, and K. Bhattacharya, "Stress fluctuation, crack renucleation and toughening in layered materials". *J. Mech. Phys Solids*, **120,** 2018, p. 68 78. 47 citations.

E. Tanné, T. Li, B. Bourdin, J.-J. Marigo, C. Maurini, "Crack nucleation in variational phase-field models of brittle fracture", *J. Mech. Phys. Solids,* **110**, 2018, p. 80 99. 504 citations. 🏆 **ESI highly cited in Engineering.**

K. Yoshioka and B. Bourdin, "A Variational Fracture Model Coupled to a Reservoir Simulator". *Int. J. Rock Mech. Min.*, **88**, 2016, p. 137-150. 94 citations.

A. A. Leòn-Baldelli and B. Bourdin, "On the asymptotic derivation of Winkler-type energies from 3D elasticity". *J. Elasticity*, **121**, 2015, p. 275 301. 15 citations.

A. Mesgarnejad, B. Bourdin, and M. Khonsari, "Validation simulations for the variational approach to fracture". *Comput. Methods. Appl. Mech. Engng.*, **290**, 2015, p. 420 437. 215 citations.

M. Z. Hossain, C-J Hsueh, B. Bourdin, and K. Bhattacharya, "Effective toughness of heterogeneous media". *J. Mech. Phys. Solids,* **71**, 2014, p. 320 348. 223 citations.

A. A. Leòn-Baldelli, J.-F. Babadjian, B. Bourdin, D. Henao, and C. Maurini, "A variational model for fracture and debonding of thin films under in-plane loading". *J. Mech. Phys. Solids,* **70** 2014, p. 15 32. 59 citations.

B. Bourdin, J.-J. Marigo, C. Maurini and P. Sicsic, "Morphogenesis and propagation of complex cracks induced by thermal shocks". *Phys. Rev. Letters*, **112** (1), 2014, 014301. 318 citations.

A. Mesgarnejad, B. Bourdin, and M. Khonsari, "A variational approach to the fracture of brittle thin films under out of plane loading". *J. Mech. Phys. Solids,* **61** (11), 2013, p. 2360 2379. 43 citations.

C. Maurini, B. Bourdin, G. Gauthier and V. Lazarus, "Crack patterns obtained by unidirectional drying of a colloidal suspension in a capillary tube: experiments and numerical simulations using a two-dimensional variational approach", *Int. J. Fracture* **184** (1-2), 2013, p. 75 91. 62 citations.

B. Bourdin, C. Chukwudozie, and K. Yoshioka, "A variational approach to the numerical simulation of hydraulic fracturing under in-situ stresses". Proceedings of the 38th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA, February 11-13, 2013. 33 citations.

A. A. Leon Baldelli, B. Bourdin, J.-J. Marigo, and C. Maurini, "Fracture and debonding of a thin film on a stiff substrate: analytical and numerical solutions of a one-dimensional variational model." *Cont. Mech. Thermodyn.* **25** (2-4), 2013, p. 243 268. 45 citations.

C. Chukwudozie, B. Bourdin, K. Yoshioka, T. Buchmann, and P.A. Connolly. "New Modeling Approach to Natural Fracturing Process". Proceedings of the 47th U.S. Rock Mechanics / Geomechanics Symposium. San Francisco, California. ARMA-2013-100. 2 citations.

B. Bourdin, C. Chukwudozie, and K. Yoshioka, "A variational approach to the numerical simulation of hydraulic fracturing". Proceedings of the 2012 SPE Annual Technical Conference and Exhibition, SPE 159154. 189 citations.

B. Bourdin and G. A. Francfort, Variational Models and Methods in Solid and Fluid Mechanics, chapter "Fracture". CISM Courses and Lectures, vol. 535. Springer, 2011.

B. Bourdin, M. Knepley and C. Maurini, "Numerical Simulation of Reservoir Stimulation - A Variational Approach". Proceedings of the 36th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA, 2011. 10 citations.

B. Bourdin, C. J. Larsen and C. Richardson, "A time-discrete model for dynamic fracture based on crack regularization". *Int. J. Fracture* **168** (2), 2011, p. 133 143. 333 citations.

B. Bourdin, M. Knepley and C. Maurini, "Secondary Thermal Cracks in EGS: a Variational Approach". Proceedings of the 34th annual meeting of the Geothermal resources Council, Sacramento, CA, 2010. 6 citations.

B. Bourdin, D. Bucur and É. Oudet, "Optimal partitions for eigenvalues". *SIAM J. Sci. Comp.* **31** (6), 2009, p. 4100 4114. 77 citations.

B. Bourdin, G. A. Francfort and J.-J. Marigo, "The variational approach to fracture", *J. Elasticity* **91** (1-3), 2008, p. 5 148. 2108 citations. 🏆 **Formerly ESI highly cited in Engineering.**

B. Bourdin and R. V. Kohn, "Optimization of Structural Topology in the High-Porosity Regime", *J. Mech. Phys. Solids* **56** (3) 2008, p. 1043 1064. 27 citations.

B. Bourdin, "Numerical implementation of the variational formulation of quasi-static brittle fracture", *Interfaces Free Bound.* **9,** 2007, p. 411 430. 418 citations. 🏆 **ESI highly cited in Mathematics.**

B. Bourdin, "*The variational formulation of brittle fracture: numerical implementation and extensions*" IUTAM Symposium on Discretization methods for evolving discontinuities (T. Belytschko, A. Combescure, and R. de Borst eds.), Springer, 2007, p. 381 393. 48 citations.

B. Bourdin and A. Chambolle, "*The phase-field method in optimal design*", IUTAM Symposium on Topological Design Optimization of Structures, Machines and Material (M.P. Bendsøe, N. Olhoff, and O. Sigmund eds.), Solid Mechanics and its Applications, Springer, 2006, p. 207 216. 79 citations.

J.-H. Kimn and B. Bourdin, "*Numerical implementation of Overlapping Balancing Domain Decomposition Method on Unstructured Meshes*", Domain Decomposition Methods in Science and Engineering XVI (Olof B. Widlund and David E. Keyes, eds.), Lecture Notes in Computational Science and Engineering, vol. 55, Springer-Verlag, 2006, p. 309 315. 6 citations.

B. Bourdin and A. Chambolle, "Design-dependent loads in topology optimization", *ESAIM Control, Optimization and Calculus of Variations* **9** (2003), p. 19 48. 490 citations.

B. Bourdin, "Filters in topology optimization", *Int. J. Numer. Meth. Engng.* **50** (9), 2001, p. 2143 2158. 1258 citations.

B. Bourdin, G. A. Francfort and J.-J. Marigo, "Numerical Experiments in Revisited Brittle Fracture", *J. Mech. Phys. Solids* **48** (4), 2000, p. 806 826. 2444 citations.

B. Bourdin and A. Chambolle, "Implementation of an Adaptive Finite Elements Approximation of the Mumford-Shah Functional", *Num. Mat.* **85** (4), 2000, p. 609 646. 193 citations.

B. Bourdin, "Image segmentation with a finite elements method", *M2AN Math. Model. Numer. Ana.* **33** (2), 1999, p. 229 244. 125 citations.

B. Bourdin, "Une méthode variationnelle en mécanique de la rupture, théorie et applications numériques". PhD thesis, Université Paris Nord, France, 1998. 26 citations.

* Citation counts as of August 2024.

**Articles in broader public publications:**

Moment, Mentor, Memento podcast, Faculty of Science, McMaster University, Jul. 2024.

S. Chen, "What it's cracked up to be", Physics, **14**(8), Jan. 2021.

"A material cracks barriers to asymmetrical toughness", Research Highlight, Nature **589**(7843), Jan. 2021.

B. Bourdin and G. A. Francfort, "Past and present of variational fracture", *SIAM News,* **52**(9), Nov. 2019.

R. Barrow "New energy research conducted on campus", LSU Reveille Nov. 25, 2013.

**Software:**

**vDef:** A parallel unstructured three-dimensional implementation of the variational phase-field approach to fracture, DOI:10.5281/zenodo.3242131. vDef is in use in several industrial and academic research groups.

**SNLP:** A fork of Brian C. Fabien's Sequential Non Linear Programming code, with PETSc interface and fortran90 iso_c_bindings, DOI:10.5281/zenodo.3242159.

**VPFHF:** A structured parallel three-dimensional finite element hydro-mechanical reservoir simulator from C. Chukwudozie, B. Bourdin, and K. Yoshioka, "A Variational Phase-Field Model for Hydraulic Fracturing in Porous Media", DOI:10.5281/zenodo.3242138.

**partitions:** Computations of partitions minimizing the eigenvalues of the Dirichlet Laplacian from Bourdin, B., Bucur, D., & Oudet, É. (2009). Optimal Partitions for Eigenvalues. SIAM J. Sci. Comput., 31(6), 4100 4114, DOI:10.5281/zenodo.3242188.

## Grant History

*Over 9M$ in research grants including 3M$ as lead PI*

**MITACS GRA**, "Towards a predictive understanding of glass toughening by crystalline inclusions", CA$6,000 over 3 months. Awarded April 2024.

**Fond France-Canada de Recherche** (**France-Canada Research Fund**), "*Morphologie des fissures et formes à durabilité optimale*" with E. Bonnetier at Université Grenoble Alpes. PI, CA$ 15,000 over two years. Awarded June 2022.

**NSERC Discovery grants program**, "*Variational phase-field models of fracture*", PI, CA$ 185,000 over 5 years. Awarded April 2022.

**Office of Naval Research**, Long Range BAA for Navy and Marine Corps Science and Technology program, *"Phase Field Fracture Simulation Assessment"*, with P. Voorhees at Northwestern University, and K. Bhattacharya and K.T. Faber at Caltech, US$2.2M over 4 years. McMaster part: US$398,019. Awarded July 2021.

**NSF Division of Mathematical Sciences**, Applied Mathematics program: *"Collaborative Research: Optimal Design of Responsive Materials and Structures"*, DMS 2009303 with K. Bhattacharya at Caltech, $553,000 over three years. LSU part: US$277,000. Awarded July 2020.

**NSF Office of Integrative Activities**: "*RII Track-1: Louisiana Materials Design Alliance (LAMDA)*", OIA 1946231, senior investigator, US$20M over 5 years. Awarded May 2020.

**Asahi Glass Company, Japan**: *"Laser cutting of tempered and un-tempered glass"*, PI, US$50,000. Awarded May 2019, extended May 2020.

**Chevron ETC**: "*Modeling and simulation of natural fracture networks in sedimentary rocks*", PI. US$36,000 over 3 month. Awarded Apr. 2019.

**NSF Division of Mathematical Sciences**, Applied Mathematics Program: *"Diffusion driven fracture"*, DMS 1716763, PI, US$311,973 over three years. Awarded Sept. 2017.

**CNRS**, PICS (International program for scientific collaboration), France, Co-PI, 29,000€ over three years. Awarded 02-2017.

**Chevron ETC**, Rocks Mechanics Team: "*Investigating non-linear effects within the realm of variational fracture*", PI, US$50,000 over two year. Extended 03-2017.

**NSF Division of Mathematical Sciences**, DMREF Program: "*Designing Microstructure for Engineering Toughness*", DMS 1535076 with K. Bhattacharya, G. Ravichandran, and K. Faber at Caltech, US$1,260,000 over three years. LSU part: US$240,000 Awarded 09-2015.

**Chevron ETC**, Rocks Mechanics Team: "*Investigating non-linear effects within the realm of variational fracture*", PI, US$145,000 over two year. Awarded 12-2014.

**Corning Inc.**: *"The variational approach to fracture: stage I",* PI, US$20,760 over 6 month, 2014.

**LSU Office of Research and Economic Development**: *"Towards a center on enabling process innovation through computation - EPIC",* Co-PI, US$60,000 over 1 year. Awarded June 2014.

**NSF Division of Mathematical Sciences**, Applied Mathematics Program: "*Variational approaches to defect mechanics*", DMS 1312739, PI, US$163,886 over three years. Awarded 2013.

**Louisiana Board of Regents**: "*Geothermal Resources: Cross-Disciplinary Research and Student Training*", Co-PI, US$107,237 over 2 years. Awarded 04-2011.

**Chevron ETC**, Division of Special Projects and Unconventional Resources: "*Coupling heat and mass transfer with the variational approach to fracture*", PI, US$375,000. Awarded 12-2010, extended 12-2011, 06-2013, and 12-2013.

**Chevron ETC**, Division of Special Projects and Unconventional Resources: "*Variational fracture for oil shale stimulation*", PI, US$100,000 over one year. Awarded 10-2010.

**NSF, Division of Mathematical Sciences**, Applied Mathematics Program: "*Applications of Variational Fracture: Enhanced Geothermal Systems",* DMS 0908267, PI, US$314,139 over three years. Awarded 07-2009.

**CNRS**, PICS (International program for scientific collaboration), France, Co-PI, 20,000€ over three years. Awarded 04-2007.

**NSF, Division of Mathematical Sciences**, Applied Mathematics Program: "*A Free Discontinuity Approach to Brittle Fracture Mechanics: Analysis and Numerical Implementation",* DMS 0605320, PI, US$153,000 over three years. Awarded 05-2006.

**Louisiana Board of Regents**, Enhancement Program: "*Enhancement of Material Sciences in the LSU Mathematics Department",* Co-PI, US$116,000 over two years. Awarded 05-2005.

**NSF, Division of Graduate Education**, Integrated Graduate Education, Research and Training: "*IGERT on Multi-Scale Computational Fluid Dynamics",* DGE 0504507, Co-PI, US$2,907,907 over five years. Awarded 07-2005.

**LSU Council on Research**, Faculty Research Grant: "*Numerical Simulation and Visualization of Three-Dimensional Free-Discontinuity Problems"*, PI, US$9,800 over one year. Awarded 08-2004.

**Louisiana Board of Regents**, Research and Competitiveness Program: "*Phase field method in Optimal design"*, PI, US$64,665 over three years. Awarded 05-2003.

**LSU Council on Research**, Summer Stipend Program, PI, US$5,000 over one month. Awarded 07-2003.

High Performance Computing allocations at LSU, LONI, NSF-Teragrid, NSF-XSEDE, and ComputeCanada since 2005.

## Plenary and Keynote Lectures

**Oct. 2024** IITB - IoE - SCPP workshop "Fracture: Modelling and experiments", Indian Institute of Technology Bombay, India. Keynote lecture.

**May 2023** 11ème Biennale Française des Maths Appliquées et Industrielles (SMAI), Gosier, Guadeloupe, France. Plenary lecture.

**May 2021** SIAM Conference on Mathematical Aspects of Materials Science (MS20), online. Plenary lecture.

**Oct. 2018** Society of Engineering Science 55th Annual Technical Meeting, mini-symposium "*Phase-Field Modeling in Materials Science and Engineering*", Madrid, Spain. Keynote lecture.

**Oct. 2017** Mathias conference, TOTAL, Paris, France. Keynote lecture.

**June 2017** 5th Conference on Computational Modelling of Fracture and Failure of Materials and Structures (CFRAC 2017), Nantes, France. Plenary lecture.

**May 2017** 10th ICACM US-France Symposium Dynamic Damage and Fragmentation, Fort Walton, FL. Keynote lecture.

**May 2015** Workshop "*Hydraulic Fracturing: From Modelling and Simulation to Reconstruction and Characterization*", Institute for Mathematics and their Applications, Minneapolis, MN. Keynote lecture.

**Jul. 2014** Continuum Models Discrete Systems 13, University of Utah, UT. Keynote lecture.

**Oct. 2011** Mathematical Aspects of Continuum Mechanics CoMFos 2011 conference, Hiroshima Kokusai Gakuin University, Japan. Two plenary lectures.

## Presentations in Workshops and Summer Schools

**Oct. 2024** IITB - IoE - SCPP short course "Modelling fracture through phase-field techniques", Indian Institute of Technology Bombay, India. 6 lectures.

**July 2024** 9th CISM-ECCOMAS Advanced School "Variational fracture mechanics and phase-field models", Udine, Italy. 6 lectures.

**May 2022** CIRM workshop: workshop "Beyond Elasticity: Advances and Research Challenges", Luminy, France.

**Oct. 2021** "NewFrac" workshop, University of Seville, Spain.

**Apr. 2019** "*Phase Field Methods Workshop VIII*", Center for Hierarchical Materials Design, Northwestern University, IL, USA.

**June 2017** Workshop "*ARAMIS - Analysis of Robust Asymptotic Methods In numerical Simulation in mechanics*", Université de Pau et pays de l'Adour, Pau, France.

**Jul. 2016** International Conference "*Calculus of Variations, Optimal Transportation, and Geometric Measure Theory: from Theory to Applications*", Université Claude Bernard - Lyon 1, Lyon, France.

**Sept. 2015** LANL CNLS workshop "*Grand Challenges in Geological Fluid Mechanics*", Santa Fe, NM.

**Aug. 2015** Workshop "*Dynamics of Dykes Propagation*", NTU, Singapore.

**Apr. 2015** Workshop "*Fluid-Driven Fracture Propagation*", Eindhoven (TU/e), The Nederland.

**Sept. 2014** Workshop "*Variational Modelling in Solid Mechanics*", University of Udine, Italy.

**Feb. 2014** Short course "*Variational models of fracture*", Corning Inc., Corning, NY.

**June 2013** CISM-IUTAM Summer School "*Variational Approaches to Damage in Continua and Interfaces*", 6 lectures, Udine, Italy.

**May 2013** Workshop *"Fragmentation"*, Laboratoire de Mécanique et d'Acoustique, Marseille, France.

**Apr. 2011** Mini-workshop "*Mathematical Models, Analysis, and Numerical Methods for Dynamic Fracture*", Mathematisches Forschungsinstitut Oberwolfach, Germany.

**June 2009** LMS-EPSRC *"Short Course on the Mathematics of Materials Science"* 2 lectures on numerical aspects of the variational approach to Fracture, Mathematical Institute, Oxford University, UK.

**Sept. 2008** IUTAM Symposium "*Variational Concepts with Applications to the Mechanics of Materials*", Bochum, Germany.

**Sept. 2008** Lloyd Roeling Conference. University of Louisiana LA.

**Apr. 2007** Mini-Workshop: "*Shape Analysis for Eigenvalues*", Mathematisches Forschungsinstitut Oberwolfach, Germany.

**Feb. 2007** Workshop "*Analysis and Numerics for Rate-Independent Processes*", Mathematisches Forschungsinstitut Oberwolfach, Germany.

**Jan. 2007** Workshop "*Free Discontinuity Problems: From Image Processing to Material Science*", LSU, LA.

**Sept. 2006** IUTAM Symposium "*Discretization Methods for Evolving Discontinuities*", Lyon, France.

**Oct. 2005** IUTAM Symposium "*Topological design optimization of structures, machines and materials*", Rungstedgaard, Denmark.

**Sept. 2000** Summer school "*School on mathematical problems in image processing*", Abdus Salam International Center for Theoretical Physics, ICTP, Trieste, Italy. Computer session in coordination with A. Chambolle's lectures.

**Nov. 2003** Workshop *"Applied Inverse Problems: Theoretical and Computational Aspects"*, part II, Institute for Pure and Applied Mathematics, Los Angeles, CA.

**May 2003** Workshop *"Applied Inverse Problems: Theoretical and Computational Aspects"*, part I, Institute for Pure and Applied Mathematics, Los Angeles, CA.

**June 1999** Workshop "*Optimisation de Forme*", Centre International de Rencontres Mathématiques, Marseille, France.

## Other Conferences, Seminars and Colloquia

**Aug. 2024** Society of Engineering Science Annual Technical Meeting, Prager medal symposium, Hangzhou, China.

**July 2024** World Congress on Computational Mechanics (WCCM 2024), mini-symposium "Phase-field models of fracture", Vancouver, BC, Canada.

**Apr. 2024** Research Data Management community of practice, McMaster University, Hamilton, ON, Canada.

**Mar. 2024** Applied maths seminar, University of Ottawa, ON, Canada.

**Jan. 2024** Phase-Field Fracture for heterogeneous materials. 2nd annual meeting of the Canadian Society for Computational Science and Engineering, Banff, AB, Canada.

**Dec. 2023** MePhy Day, Université Pierre et Marie Curie, France.

**Nov. 2023** Materials Modelling and Simulation for Nuclear Fuels (MMSNF) Workshop, McMaster University, ON, Canada.

**Nov. 2023** Applied Math Seminar, Simon Frasier University, Vancouver, BC, Canada.

**Oct. 2023** Modeling seminar, Department of Mathematics, University of Arizona (virtual), USA.

**Aug. 2023** 10th International Congress in Industrial and Applied Mathematics (ICIAM 2023), Tokyo, Japan.

**Aug. 2023** 6th Applied Mathematics, Modeling and Computational Science (AMMCS) International Conference, Waterloo, ON, Canada.

**June 2023** PETSc 2023 User Meeting, Illinois Institute of Technology, Chicago, IL, USA.

**May 2023** Southern Ontario Numerical Analysis Day (SONAD 2023), University of Waterloo, ON, Canada,

**Apr. 2023** "Matherials" seminar, Université Grenoble Alpes, France.

**Feb. 2023** Brockhouse Institute for Materials Research colloquium, McMaster University, Hamilton, ON, Canada.

**Dec. 2022** Canadian Mathematical Society Winter meeting, mini symposium "Calculus of Variations", Toronto, ON, Canada.

**Sept. 2022** Materials Science & Engineering colloquium, McMaster University, Canada.

**Jul. 2022** 11th European Solid Mechanics Conference, Galway, Ireland.

**June 2022** McMaster / Université Grenoble Alpes workshop, McMaster University, Hamilton, ON, Canada.

**Feb. 2022** MICDE / AIM seminar, University of Michigan, Ann Arbor, MI, USA.

**Dec. 2021** Oxford Computational Mathematics and Applications seminar, University of Oxford, UK.

**Feb. 2021** Special Applied Mathematics Seminar, Department of Mathematics & Statistics, McMaster University, Hamilton, ON, Canada.

**Oct. 2020** LANS seminar, Argonne National Laboratories, Lemont, IL, USA.

**Jul. 2020** SIAM annual meeting, mini symposium "Mini-symposium on the NSF Program Designing Materials to Revolutionize and Engineer our Future", online.

**Oct. 2019** Society of Engineering Science 56th technical meeting, mini-symposium "*Regularized models of fracture for hard and soft solids*", Washington University of St Louis, MO, USA.

**June 2019** 6th Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2019), mini-symposium "*Regularized Fracture Models*", Braunschweig, Germany.

**Apr. 2019** Robert W. Courter Seminar, Department of Mechanical and Industrial Engineering, Louisiana State University, Baton Rouge, LA, USA.

**Jan. 2019** Mechanical and Civil Engineering Seminar, California Institute of Technology, Pasadena, CA.

**Oct. 2018** 1st TX-LA SIAM sectional meeting, mini-symposium "*Mathematical and computational aspects of fracture*", Louisiana State University, Baton Rouge, LA, USA.

**Oct. 2018** Applied Analysis Seminar, Louisiana State University, Baton Rouge, LA, USA.

**Jul. 2018** 13th World Congress on Computational Mechanics, mini-symposium "*Advances in phase-field modelling of fracture*", New York, NY, USA.

**Aug. 2017** Mechanical Engineering Seminar, University of Michigan Joint Institute, Shanghai Jiao-Tong University, Shanghai, China.

**June 2017** Research Seminar, Materials & Structures division, ONERA, Lille, France.

**June 2017** International Conference on Fracture, mini-symposium "*Diffuse-interface models of fracture*", Rhodes, Greece.

**Sept 2016** Solid Mechanics seminar, School of Engineering, Brown University, Providence, RI.

**Sept 2016** Shell lecture, Computational & Applied Mathematics Department, Rice University, Houston, TX.

**Jul. 2016** 12th World Congress on Computational Mechanics, mini-symposium "*Variational and Phase Field Models of Damage and Fracture*", Seoul, Korea.

**Mar. 2016** Warren lecture, Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, Minneapolis, MN.

**Mar. 2016** Graduate seminar, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, IL.

**Oct. 2015** Society of Engineering Science 52nd annual meeting, mini symposium "*Fracture Mechanics*". Texas A&M University, College Station, TX.

**Sept. 2015** CCR seminar, Sandia National Laboratories, Albuquerque, NM.

**Apr. 2015** Pan-American Congress on Computational Mechanics, mini-symposium "*Numerical Modelling of Damage Evolution and Propagating Discontinuities in Solids at Failure*" Buenos Aires, Argentina.

**Oct. 2014** Special Seminar, Shell Gasmer Research Center, Houston, TX.

**Apr. 2014** ICES Seminar, ICES, University of Texas, Austin, TX.

**Feb. 2014** Scientific Computing Seminar, Department of Mathematics, University of Houston, TX.

**Oct. 2013** Graduate seminar, Energy and Research Engineering department, Stanford University, Stanford, CA.

**Oct. 2013** Special seminar, Corning Research Labs, Corning, NY.

**Sept. 2013** Colloquium, Department of Mathematics, LSU, Baton Rouge, LA.

**Aug. 2013** SES 50th Annual Technical Meeting, mini-symposium "*Crack initiation and growth: methods, applications, and challenges*", Brown University, RI.

**June 2013** 3rd Conference on Computational Modelling of Fracture and Failure of Materials and Structures (CFRAC 2013), mini-symposium "*Present and future of crack tracking algorithms*", Prague, Czech Republic.

**Oct. 2012** Computational and Applied Mathematics Colloquium, Cornell University, NY.

**July 2012** Advanced Problems in Mechanics international conference and summer school (APM2012), mini-symposium *"Exotic structures and homogenization"*, St Petersburg, Russia.

**July 2012** Special seminar, Exxon-Mobil Strategic Research Center, Anandale, NJ.

**May 2012** Congrès d'Analyse Numérique, mini-symposium "*Méthodes Variationnelles en Mécanique de la Rupture*", Superbesse, France.

**May. 2012** Numerical Analysis seminar, University of Maryland, MD.

**Oct. 2011** QNA Seminar, Department of Mathematics, Kyushu University, Japan.

**Aug. 2011** Congrès Français de Mécanique, mini-symposium "*Mathématiques et Mécanique*", Besançon, France.

**Jan. 2011** Scientific Computing Across Louisiana (ScaLa), Tulane University, LA.

**Jan. 2011** Stanford Geothermal Workshop, Stanford University, CA.

**Nov. 2010** Mechanical Engineering Seminar, California Institute of Technology, CA.

**Oct. 2010** Geothermal Resource Council 34th annual meeting, Sacramento, CA.

**Sept. 2010** Mechanics and Computation Seminar, Department of Mechanical Engineering, Stanford University, CA.

**Sept. 2010** Applied Analysis Seminar, Department of Mathematics, LSU, Baton Rouge, LA.

**Apr. 2010** Applied Mathematics Seminar, Department of Mathematics, University of Utah, UT.

**Feb. 2010** Applied Mathematics Colloquium, Department of Mathematics, UCLA, CA.

**Dec. 2009** Colloquium, Department of Petroleum Engineering, LSU, Baton Rouge, LA.

**Nov. 2009** Séminaire de Mécanique, Laboratoire de Mécanique des Solides, École Polytechnique, France.

**Nov. 2009** Séminaire de la Fédération Francilienne de Mécanique, École des Mines de Paris, France.

**June 2009** Colloquium, Institut Jean le Rond d'Alembert, Université Pierre et Marie Curie, Paris, France.

**Mar. 2009** SIAM Student seminar, CCT, Louisiana State University, LA.

**May 2008** SIAM Conference on Mathematical Aspects of Materials Science, mini-symposium "*Damage and Fracture Evolution*", Philadelphia, PA.

**Nov. 2007** Mathematics and Computer Science Division Seminar, Argonne National Laboratories IL.

**July 2007** 9th U.S. National Congress on Computational Mechanics, mini-symposium "*Numerical Techniques for the Modeling of Failure in Solids*", San Francisco, CA.

**Jan. 2007** 113th AMS Annual Meeting, mini-symposium "*Free Discontinuity Problems: From Image Processing to Material Science*", New Orleans, LA.

**Nov. 2006** Applied Analysis Seminar, Department of Mathematics, LSU, Baton Rouge, LA.

**Sept. 2006** Colloquium, Department of Mathematics, Worcester Polytechnic Institute, Worcester, MA.

**Apr. 2006** 1015th AMS South-Eastern Sectional Meeting, mini-symposium "*Imaging, Homogenization, and Shape Optimization*", Miami, FL.

**July 2005** SIAM Annual Meeting, mini-symposium "*Optimal Control Applications in Engineering*", New Orleans, LA.

**July 2005** 8th U.S. National Congress on Computational Mechanics, mini-symposium "*Homogenization: Symposium in Honor of Prof. Ivo Babuska*", Austin, TX.

**Oct. 2004** Computational Fluid Dynamics Seminar, Department of Mechanical Engineering, LSU, Baton Rouge, LA.

**June 2004** SIAM Conference on Mathematical Aspects of Materials Science, mini-symposium "*Composites and Polycrystals*", Los Angeles, CA.

**Sept. 2003** Applied Analysis Seminar, Department of Mathematics, LSU, Baton Rouge, LA.

**June 2003** 7th US Congress on Computational Mechanics, mini-symposium "*Optimal Design*", Albuquerque, NM.

**Mar. 2003** AMS South-East Sectional Meeting, mini-symposium *"Mathematics of Material Science"*, Louisiana State University, Baton Rouge, LA.

**Feb. 2003** Colloquium, Department of Mathematics, Worcester Polytechnic Institute, Worcester, MA.

**June 2002** 14th United States National Congress on Theoretical and Applied Mechanics, Virginia Tech Blacksburg, VA.

**June 2002** 15th ASCE Engineering Mechanics Conference, mini-symposium *"Micromechanics of Heterogeneous Materials"*, Columbia University New York, NY.

**May 2002** Numerical Analysis and Scientific Computing Seminar, Courant Institute for Mathematical Science, New York University, NY.

**Mar. 2002** Colloquium, Department of Mathematics, LSU, Baton Rouge, LA.

**Feb. 2002** Colloquium, Department of Theoretical and Applied Mathematics, University of Akron, OH.

**Feb. 2002** Colloquium, Department of Mathematics, Virginia Tech, Blacksburg, VA.

**Jan. 2002** Colloquium, Department of Mathematics, Rutgers University, NJ.

**Mar. 2001** Colloquium, Department of Computational and Applied Mathematics, Rice University, TX.

**Feb. 2001** Colloquium, Department of Mathematics and Computer Science, Kent State University, OH.

**Feb. 2001** Colloquium, Department of Mathematics, Purdue University, West Lafayette, IN.

**Feb. 2001** Colloquium, Department of Mathematical Science, Stevens Institute of Technology, Hoboken, NJ.

**Jan. 2001** Applied Mathematics Seminar, Courant Institute of Mathematical Science, New York University, New York, NY

## Conferences, Workshops, and Symposia Organized

**Jul. 2024** World congress on Computational Mechanics, mini symposium "Phase-field models of fracture", Vancouver, BC, Canada. Organized with Keita Yoshioka and Oscar Lopez-Pamies.

**Aug. 2023** 10th International Congress in Industrial and Applied Mathematics (ICIAM 2023), mini symposium "*Computational methods for interfaces in physics and mechanics*", Tokyo, Japan. Organized with Antonin Chambolle.

**June 2023** 15th International Congress on Fracture (ICF15), Atlanta, GA, USA. Scientific Advisory Committee.

**Sept. 2020** Society of Engineering Science 57th technical meeting, mini-symposium "*Phase-field models of fracture*", University of Minnesota (online). Organized with Oscar Lopez-Pamies.

**Oct. 2019** Society of Engineering Science 56th technical meeting, mini-symposium "*Regularized models of fracture for hard and soft solids*", Washington University of St Louis, MO, USA. Organized with Oscar Lopez-Pamies.

**June 2019** 6th Conference on Computational Modelling of Fracture and Failure of Materials and Structures (CFRAC 2019), Braunschweig, Germany. Scientific Committee.

**Mar. 2019** BIRS workshop "*Phase-field models of fracture*", Banff International Research Station, Canada. Organized with with L. De Lorenzis and M. Kimura.

**Oct. 2018** 1st TX-LA SIAM sectional meeting, mini symposium "*Mathematical and computational aspects of fracture*", Louisiana State University, Baton Rouge, LA, USA. Organized with R. Lipton.

**July 2018** 13th World Congress on Computational Mechanics, mini-symposium "*Advances in phase-field modelling of fracture*", New York, NY, USA. Organized with L. De Lorenzis, C. Maurini, and R, Müller.

**June 2017** 5th Conference on Computational Modelling of Fracture and Failure of Materials and Structures (CFRAC 2017), mini-symposium "*Regularized failure models*", Nantes, France. Organized with M. Jirasek and N. Moës.

**June 2017** From Solid Mechanics to Mathematical Analysis, a workshop on the occasion of Gilles Francfort's 60th birthday, Institut Henri Poincaré, France. Organization committee.

**June 2017** International Conference on Fracture, mini-symposium "*Diffuse-interface models of fracture*", Rhodes, Greece. Organized with A. Karma and C. Maurini.

**July 2016** 12th World Congress on Computational Mechanics, mini-symposium "*Variational and Phase Field Models of Damage and Fracture*", Seoul, Korea. Organized with C. Maurini.

**May 2016** BIRS workshop "*Variational models of fracture*", Banff International Research Station, Canada. Organized with with G. Francfort and C. Larsen.

**Jan. 2007** Workshop "*Free Discontinuity Problems: From Image Processing to Material Science*", LSU, Baton Rouge, LA.

**Jan. 2007** 113th AMS Annual Meeting, mini-symposium "*Free Discontinuity Problems: From Image Processing to Material Science*", New Orleans, LA. Organized with C. Larsen.

## Consulting Activities

Asahi Glass Company (AGC): Course on phase-field models of fracture and technical support for the open-source variational phase-field code vDef. Scientific collaboration from 2018 until 2020.

CODELCO (Corporación Nacional del Cobre), Chile: White paper on modelling seismicity induced by hydraulic fracturing in the El Teniente copper mine, in collaboration with Anthony Peirce (Department of Mathematics, University of British Columbia, Canada), 2018.

Corning Inc.: Course on phase-field models of fracture and technical support for the open-source variational phase-field code vDef used in the modelling group. Scientific collaboration in 2014.

Chevron ETC: Two courses on phase-field models of fracture and technical support for the open-source variational phase-field code vDef used in the geo-mechanics group. Various projects from 2010 until 2021.

## Teaching History

**Sum. 2024** CISM ECCOMAS advanced course "Variational fracture mechanics and phase-field models". Six lectures.

**Win. 2024** MATH 2ZZ3 "Engineering Mathematics IV"

**Fall 2023** MATH741 "Applied Mathematics I".

**Win. 2023** MATH 724 "Fourier Analysis".

**Fall 2022** MATH 1X03 "Calculus for Math & Stats I", course coordinator.

**Win. 2022** MATH 4FT3 / 6FT3 "Topics in differential equations".

**Jan. 2021** Special course "Variational and phase field models of fracture". Inaugural lecture of the Mechanical and Industrial Engineering Doctoral Program, University of Seville, Spain. 3 days.

**Fall 2020** MATH 1553 "Honours Analytic Geometry and Calculus II".

**Fall 2020** MATH 4340 "Partial Differential Equations".

**Fall 2019** MATH 2058 "Honors Multi-Dimensional Calculus".

**Fall 2019** MATH 4340 "Partial Differential Equations".

**Spr. 2019** MATH 1552 "Analytic geometry and calculus II". Engineering residential college, LSU.

**Dec. 2018** Special course "Variational phase-field models of fracture", Asahi Glass Company, Yokohama, Japan. Four days.

**Fall 2018** MATH 2058 "Honors multi-dimensional calculus".

**Feb. 2018** Special course "Variational phase-field models of fracture", Chevron ETC, Houston, TX. Four days.

**Spr. 2018** MATH 7384 "Variational phase-field models of fracture".

**Feb. 2018** Special course "Variational phase-field models of fracture", Chevron ETC, Houston , TX. Four days.

**Fall 2017** MATH 2057 Multi-dimensional calculus (two sections).

**Sum. 2017** Research summer school "Free discontinuity problems and applications in fracture mechanics", University of Nottingham in Ningbo China. Four lectures.

**Spr. 2017** MATH 2065 "Ordinary differential equations".

**Fall 2016** MATH 2070 "Mathematical methods in engineering".

**Spr. 2016** MATH 2085 "Linear algebra".

**Fall 2015** MATH 2070 "Mathematical methods in engineering".

**Spr. 2015** MATH 7384 "Fundamentals of High-Performance Computing".

**Fall 2014** MATH 2070 "Mathematical Methods in Engineering".

**Feb. 2014** Special course "The variational approach to fracture". Corning research Laboratories, Corning, NY, USA. Four days.

**2007 13** Fundamental of Engineering math review sessions for the College of Engineering.

**Fall 2013** MATH-2090 "Elementary differential equations and linear algebra" (two sections).

**Sum. 2013** CISM-IUTAM Summer School "Variational approaches to damage in continua and interfaces", Udine, Italy. Six lectures.

**Spr. 2013** MATH 2090 "Elementary differential equations and linear algebra" (two sections).

**Fall 2012** MATH-7384 Topics in rational mechanics: Elasticity and plasticity.

**Fall 2011** MATH-2057 "Multidimensional calculus" (two sections).

**Spr. 2011** MATH-7384 "The variational approach to fracture".
MATH-2065 "Ordinary differential equations".

**Sum. 2009** Fracture course in the "New frontiers in the mathematics of solids" mathematics of material science LMS-EPSRC short course, University of Oxford, UK. Two lectures

**Fall 2008** MATH-7380 "Free discontinuity problems in fracture mechanics and image processing".
MATH-4036 "Complex variables".

**Spr. 2008** MATH-3355 "Introduction to probabilities".
MATH-2065 "Differential equations and linear algebra".

**Fall 2007** MATH-7380 "Elliptic solvers: analysis and parallel implementation".
MATH-1551 "Honors calculus I".

**Fall 2006** ME-4933 "Multidisciplinary fluid dynamics: computational methods" (finite elements module).
MATH-1552 "Calculus II".

**Spr. 2006** ME-4933 "Multidisciplinary fluid dynamics: computational methods" (finite elements module).

**Spr. 2005** MATH-7380 "Finite elements method".
MATH-2057 "Multidimensional calculus".

**Fall 2004** MATH-4065 "Numerical Analysis".
MATH-2065 "Elementary ordinary differential equations".

**Spr. 2004** MATH-7380 "Finite elements method".
MATH-1552 "Calculus II".

**Fall 2003** MATH-4065 "Numerical analysis".
MATH-2065 "Elementary ordinary differential equations".

**Spr. 2003** MATH-1550 "Calculus I".

**Fall 2002** MATH- 2057 "Multidimensional calculus".

**Fall 2001** "Calculus I", New York University (NY, USA)

**Sum. 2000** Summer school "School on mathematical problems in image processing",
Computer session in coordination with A. Chambolle's lectures (10 hours).
Abdus Salam International Center for Theoretical Physics, ICTP (Trieste, Italy).

## Current and Past Students

**Undergraduate students advised:**

Sarah Ahmed, Computer Engineering major, summer research project, McMaster University, 2024.
Dennis Rapoport, Mathematics major, summer research project, McMaster University, 2023.
Gabriella Tankel, Mathematics major, senior undergraduate thesis, McMaster University, 2022 2023.
Kevin Quebedeaux, Computer Science major, LSU 2019 2021.
Nathalie Dante, Civil Engineering major, Mathematics minor, LSU, 2019 2021.
Xinyue (Tracy) Yu, Mathematics and Computer Science major, LSU, 2018 2020.
Daniel Segrest, Mechanical Engineering major, LSU, 2019 2020.
Han-Hsuan (Michael) Wu, Physics major, Mathematics minor, LSU, 2019 2020.
Alyssa Smith, Mathematics and Computer Science major, LSU, 2017.
Brandon Roberts, Mathematics and Physics major, LSU, 2017.
Jonathan Cangelosi, Mathematics and Computer Science major, LSU, 2016.
Zachary Bradshaw, Mathematics and Physics major, LSU, 2014 2018.
Paxton Turner, Math major, honors thesis, LSU, 2014.
Charles Stephens, Mathematics major, LSU, 2012 2013.
Matthew Kemp, Computer Science major, LSU, 2010 2011.
Anuj Dube, Computer Science major, LSU, 2010 2011.
Stephen Brouillette, Mathematics major, LSU, 2006 2008.

**Graduate students advised:**

Eunhae Cho, Ph.D in Computational Science and Engineering (with N. Kevlahan), 2024 .
Samba Dumbuya, MS in Mathematics, 2023 .
Jamal Shabani, Ph.D in Mathematics, Sept. 2024.
Nha Van Tran, Ph.D in Mathematics, July 2021.
Alex Dunkel, Ph.D in Mathematics Oct. 2020.
Erwan Tanné, Ph.D in Mechanics, École Polytechnique, France (with J.-J. Marigo), 2017.
Chukwudi Chukwudozie, Ph.D in Petroleum Engineering, 2016.
Ataollah Mesgarnejad, Ph.D in Mechanical Engineering, MS in Mathematics, 2014.
Navid Mozaffari, MS in Mathematics, 2014.
Kailyn Brabhan, MNS in Mathematics, 2014.
Sean Farley, MS in mathematics, 2009.
Maria Cristina Tugurlan Ph.D in Mathematics, 2008.

**External students and postdocs mentored:**
Arnaud Virelizier, MS, École des Ponts, France, Summer 2024.
Majid Arthaud, MS, École des Ponts, France, summer 2023.
Arthur Grange, MS, Université Grenoble Alpes, France. MS thesis, 2022.
Zakia Karoui, Ph.D in Mechanics UPMC and ONERA, France (with J. Berthe and C. Maurini), 2019 2022.
Stella Brach, Post doc, California Institute of Technology, 2017.
Chun-Jen Hsueh, PhD. California Institute of Technology, 2014 2017.
Orianne Sally, MS, École des Mines de St Etienne, France. 1st year project, 2015.
Zubaer Hossain, Post doc, California Institute of Technology, 2011 2015.
Andrés Alessandro Lèon-Baldelli, MS/PhD. Université Pierre et Marie Curie, France, 2010 2013.
Paul Sicsic, PhD. École Polytechnique, France, 2010 2013.
Rémi Cornaggia, MS, École Normale Supérieure, France. 1st year project, 2010.
Wesley Even, IGERT PhD co-Advisor, Department of Physics and Astronomy, LSU, 2007 2010.
Casey Richardson, PhD. Worcester Polytechnic Institute, 2006 2008.
Hanen Amor, PhD. Université Paris Nord, France, 2005 2008.

**Post-Doctoral scholars:**
Conor McCoid, 2024 .
Pooya Yousefi, 2023 .
Frédéric Marazzato, 2020 2023, currently postdoc, University of Arizona (USA).
Alexis Marboeuf, 2020 2023.
Ataollah Mesgarnejad, currently FEA Software Engineer at Bentley Systems (USA).
Andrés Alessandro Lèon-Baldelli, currently Chargé de Recherche at ENSTA-ParisTech (France).
Jung-Han Kimn, currently Associate Professor at South Dakota State University (USA).

## Service and Professional Societies

**2024** Canada Research Chairs selection committee, McMaster University.
**2023** Senate, McMaster University.
**2023** Faculty of Engineering liaison, Faculty of Science, McMaster University.
**2021 23** Equity, Diversity and Inclusion committee, Department of Mathematics, McMaster University.
**2019 21** Executive Committee, Department of Mathematics, LSU.
**2019 21** Campus Champion, NSF XSEDE.
**2016 18** College of Science Committee on Policies, LSU.
**2016 20** Graduate committee, Department of Mathematics, LSU.
**2013 20** Stampede/Stampede2 user advisory committee, Texas Advanced Computing Center.
**2012** Computer hiring committee, Department of Mathematics, LSU.
**2010** Reviewer for the Geothermal Technologies Program., Department of Energy.
**2008 10** Executive Committee, Department of Mathematics, LSU.
**2006** LSU Flagship Information Technology Strategy (FITS) Research Enablement Task Force.
**2005 12** Computer Committee, Department of Mathematics, LSU.
**2005 12** HPC Allocation Committee, Center for Computation and Technology, LSU.
**2004 21** System administration and hardware maintenance of the Math Department HPC Cluster.

**Review work:**
*Analysis & Applications*
*Applied Mathematics Letters*

*Numerical Methods for Partial Differential Equations;*
*Computer Methods in Applied Mechanics and Engineering;*
*Engineering Fracture Mechanics;*
*European Journal of Mechanics - A/Solids;*
*ESAIM: Control, Optimisation and Calculus of Variations;*
*ESAIM: Mathematical Modelling and Numerical Analysis*
*IMA Journal of Applied Mathematics;*
*International Journal of Computers & Structures;*
*International Journal for Numerical Methods in Engineering;*
*International Journal of Fracture;*
*International Journal of Solids and Structures;*
*Journal of Computational Physics;*
*Journal of Elasticity;*
*Journal of Geophysical Research / Soli Earth;*
*Journal of the Mechanics and Physics of Solids;*
*Mathematical Methods and Models in Applied Science;*
*Meccanica;*
*Mechanics of Advanced Materials and Structures;*
*Mechanics Research Communications;*
*Numerical Algorithms;*
*Numerical Methods for Partial Differential Equations;*
*Physica D;*
*Rock Mechanics and Rock Engineering;*
*SIAM Journal of Applied Mathematics;*
*SIAM Journal on Control and Optimization;*
*SIAM Journal on Mathematical Analysis;*
*SIAM Journal on Multiscale Modeling and Simulation;*
*SIAM Journal on Scientific Computing;*
*SIAM Journal on Numerical Analysis;*
*Structural and Multidisciplinary Optimization.*

Fond de Recherche du Quebec  Nature Technologie
NSF Division of Mathematical Science;
NSF Office of Cyber-Infrastructure;
U.S. Department of Energy;
National Sciences and Engineering Research Council of Canada,
    Discovery Grants Program;
    Vanier Canada Graduate Scholarships (VCGS)
LSU Council on Research;
Agence Nationale de la Recherche (ANR, France);
coFund Math PhD in France;
Israel Science Foundation.

**Membership in Professional Societies:**

Canadian Applied and Industrial Mathematics Society (CAIMS)
Society for Engineering Science (SES)
Society for Industrial and Applied Mathematics (SIAM)