

Cécile Piret

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CITIZENSHIP	Belgian and American citizen.	
RESEARCH INTERESTS	My research interests are in applied and computational mathematics. I am interested in developing and analyzing high-order numerical methods for solving differential equations. In particular, I have been focusing on techniques based on the Radial Basis Functions (RBF) method. The application areas range from computational geosciences to numerical differential geometry.	
EDUCATION	University of Colorado at Boulder, USA Ph.D., Department of Applied Mathematics, May 2008 <ul style="list-style-type: none">• Dissertation: Analytical and Numerical Advances in Radial Basis Functions• Advisor: Professor Bengt Fornberg M.S., Department of Applied Mathematics, May 2005 <ul style="list-style-type: none">• Area of Study: Numerical Analysis Metropolitan State College of Denver, USA B.S., Department of Mathematical and Computer Sciences, May 2002 <ul style="list-style-type: none">• Major in Applied Mathematics, emphasis on Computer Science (<i>Summa cum Laude</i>)	
PROFESSIONAL EXPERIENCE	Michigan Technological University, USA, Department of Mathematical Sciences <i>Associate Professor</i> August 2018 to Present <i>Assistant Professor</i> August 2014 to August 2018 <i>Classes taught</i> Calculus 1 for engineers (<i>Fall 2014</i>) Calculus 3 for engineers (<i>Fall 2015, 2016, 2017, 2018, 2019, 2020, 2022</i>) Complex Variables (<i>Spring 2015, 2016, 2017, 2019, 2021, 2023</i>) Applied Vector and Tensor Mathematics (<i>Fall 2018, 2019</i>) Introduction to Scientific Simulations (<i>Spring 2020, 2021</i>) Graduate-level Radial Basis Functions (<i>Spring 2017</i>) Graduate-level Ordinary Differential Equations (<i>Fall 2022</i>) Graduate-level Partial Differential Equations (<i>Spring 2023</i>) Université catholique de Louvain, BE, Unité de Mécanique Appliquée <i>Chargée de Recherches FNRS</i> <i>(3-year Assistant Professorship)</i> October 2012 to August 2014 <i>Post-doctoral Researcher</i> June 2010 to June 2012	

National Center for Atmospheric Research, USA

Advanced Study Program Post-doctoral Fellow

June 2008 to June 2010

University of Colorado at Boulder, USA

Instructor

Spring Semester 2008

- Class taught: “Methods in Applied Mathematics: Complex Variables and Applications.” (Senior/graduate level class in the Department of Applied Mathematics)

Research Assistant

Spring 2004 to Fall 2007

- Adviser: Professor Bengt Fornberg

VISITING
POSITIONS

Uppsala Universiteit, SE, Department of Information Technology

Visiting Researcher

July 2012 to October 2012

University of Oxford, UK, Oxford Centre for Collaborative Applied Mathematics

Visiting Post-doctoral Research Assistant

November 2009 to February 2010

HONORS, AWARDS
& FELLOWSHIPS

Michigan Technological University, USA, Department of Mathematical Sciences

- 2018 Jackson Center Instructional Award for Innovative Teaching (university-wide award), Spring 2018
- Nominated to the Dean’s Teaching Showcase, Spring 2018
- REF-RS Award for 3D Printing for Mathematics Education (3DPriME), July 1st 2016 to June 30th 2017 and extended to June 30th 2018

Université catholique de Louvain, BE

- 3-year funding from the FNRS (Fonds National de la Recherche Scientifique), October 2012 to October 2015

University of Oxford, UK

- Visiting Postdoctoral Research Assistant Fellowship (Oxford Centre for Collaborative Applied Mathematics), November 2009 to February 2010

National Center for Atmospheric Research, USA

- Advanced Study Program Fellowship (8 awarded out of 112 internationally), June 2008 to June 2010

University of Colorado at Boulder, USA

- Francis P. Stribic Graduate Fellowship, Fall 2003 and Spring 2004 (\$6000)
- Lead Graduate Teacher (Graduate Teacher Program), Fall 2003

IN THE MEDIA

Allison Mills, [Students 3-D Print Their Math Homework](#), Spring 2018, Michigan Tech News.

Kelley Christensen, [Mathematically Modeling the Return to College Campuses](#), Spring 2020, Michigan Tech, Unscripted Research Blog.

Radio interview with April Baer, [Stateside](#), Michigan Radio, September 18, 2020. [Subject of the interview.](#)

LANGUAGES

Spoken: French (Native), English (Excellent), Dutch (Good)

Programming: Java, C++, MATLAB

PROFESSIONAL SERVICE

Departmental Service

- Undergraduate Committee, 2017 to 2018.
- PTR Committee Member, 2018 to 2019.
- Recruitment Committee Member, 2019 to 2020.
- Advisory Committee Member, 2020 to 2021.

Departmental/University Service

- Committee Member on the reform of Maternal Leave, 2016.
- General Education Council, 2020 to present.
- ADVANCE Internal Evaluation and Advisory Board, 2018 to present.

External Service

- External Examiner for the PhD Defense of Yujia Chen, University of Oxford, June 30th, 2015. Dissertation: Geometric Multigrid and Closest Point Methods for Surfaces and General Domains.
- Coach for Houghton High School's Math Team (2017 to present)
- ADVANCE Cross-Institutional Mentoring Communities (CIMC) mentor, 2021 to 2022.
- 2-day NSF Panel service, 2023.

Conference/Panel Organization

- AMS Special Session co-organizer with Dr. Jonah Reeger, "Advances in Radial Basis Functions for Numerical Simulation", 2023 Spring Central Sectional AMS Meeting, University of Cincinnati, Cincinnati, OH, April 15-16, 2023.

CERTIFICATION

Foundations of Online Teaching (FoOT) University of Wisconsin, Madison Continuing Studies department, 2020.

GRADUATE STUDENTS

Jarrett Dunn (Aug 2014 to Dec 2015) M.S. Candidate, Graduated in Dec 2015.

Nadun Dissanayake (Aug 2015 to May 2021), Ph.D., Assistant Professor at Appalachian State University.

Jacob Blazejewski (Aug 2017 to May 2023) Ph.D., Instructor at Appalachian State University.

Austin Higgins (Dec 2022 to Present) Ph.D. Candidate.

Dennis Obideyi (June 2022 to Present) Ph.D. Candidate.

UNDERGRADUATE STUDENTS

Nick Olinger (June 2016 to June 2018) SURF recipient, Summer 2017.

Sam Groetsch (June 2018 to June 2019)

Caleb Jacobs (January 2019 to June 2020) SURF recipient, Summer 2020.

Austin Higgins (June 2021 to December 2022) Co-advised with Prof Bengt Fornberg
A. Higgins, Numerical Computation of Fractional Derivatives of Complex-Valued Analytic Functions, SIAM SIURO, 15 (2022).

PUBLICATIONS

BOOKS

B. Fornberg and **C. Piret**, Complex Variables and Analytic Functions: An Illustrated Introduction, SIAM, 2020.

BOOK CHAPTERS

B. Fornberg, **C. Piret**, A. Higgins, Numerical Computation of Fractional Derivatives of Caputo type, THE FUNDAMENTALS OF FRACTIONAL CALCULUS, CRC Press, accepted (2023).

PEER-REVIEWED

JOURNAL ARTICLES B. Adcock, D. Huybrechs and **C. Piret**, Stable and accurate least squares radial basis function approximations on bounded domains, submitted (2023).

B. Fornberg and **C. Piret**, Computation of Fractional Derivatives of Analytic Functions. J Sci Comput 96, 79 (2023). <https://doi.org/10.1007/s10915-023-02293-4>

Dissanayake, N., Blazejewski, J., **Piret, C.**, Ong, B. Parareal - Radial Basis Function-Finite Difference (RBF-FD) Framework for Solving Time-Dependent Partial Differential Equations. Dolomites Research Notes on Approximation, 15(5), 2022, pp. 8–23.

C. Piret, N. Dissanayake, J. Gierke and B. Fornberg, The radial basis functions method for improved numerical approximations of geological processes in heterogeneous systems, Math. Geosci., 52, 2020, pp. 477 – 497.

S. Kumar and **C. Piret**, Numerical solution of space-time fractional PDEs using RBF-QR and Chebyshev polynomials, Appl. Numer. Math., 143, 2019, pp. 300–315.

A. Petras, L. Ling, **C. Piret**, S. Ruuth, A least-squares implicit RBF-FD closest point method and applications to PDEs on moving surfaces, J. Comput. Phys., 381, 2019, pp. 146–161.

C. Piret, An RBF-based frames strategy for bypassing the Runge phenomenon, SIAM J. Sci. Comput., 38(4), 2016, pp. A2262–A2282.

E. Hanert and **C. Piret**, A Chebyshev pseudo-spectral method to solve the space-time tempered fractional diffusion equation, SIAM J. Sci. Comput., 36(4), 2014, pp. A1797–A1812.

C. Piret and E. Hanert, A Radial Basis Functions method for fractional diffusion equations, J. Comput. Phys., 238, 2013, pp. 71–81.

E. Marchandise, **C. Piret** and J.-F. Remacle, CAD and mesh repair with radial basis functions, J. Comput. Phys., 231, 2012, pp. 2376–2387.

C. Piret, The Orthogonal Gradients Method: a radial basis functions method for solving partial differential equations on arbitrary surfaces, J. Comp. Phys., 231, 2012, pp. 4662–4675.

J. Schmidt, **C. Piret**, N. Zhang, B. Kadlec, Y. Liu, D. Yuen, G. B. Wright, and E. Sevre, Modeling of tsunami equations and atmospheric swirling flows with graphics accelerated hardware (GPU) and radial basis functions (RBF), *Concurr. Comput.*, 22, 2010, pp. 1813–1835.

B. Fornberg and **C. Piret**, On choosing a radial basis function and a shape parameter when solving a convective PDE on a sphere, *J. Comput. Phys.*, 227, 2008, pp. 2758–2780.

B. Fornberg, N. Flyer, S. Hovde and **C. Piret**, Locality properties of radial basis function expansion coefficients for equispaced interpolation, *IMA J. Numer. Anal.*, 28, 2008, pp. 121–142.

B. Fornberg and **C. Piret**, A stable algorithm for flat radial basis functions on a sphere, *SIAM J. Sci. Comput.*, 30, 2007, pp. 60–80.

PEER-REVIEWED
CONFERENCE
PUBLICATIONS

Kulasekera Mudiyansele Dissanayake, N., Blazejewski, J., **Piret, C.**, Ong, B. Parareal - Radial Basis Function-Finite Difference (RBF-FD) Framework for Solving Time-Dependent Partial Differential Equations. RESCON 2021: PGIS Research Congress 2021.

C. Piret, and J. Dunn (2016). Fast RBF OGr for solving PDEs on arbitrary surfaces. AIP Conference Proceedings, 1776(1), 070005. doi:10.1063/1.4965351.

E. Hanert and **C. Piret**, Numerical solution of the space-time fractional diffusion equation: Alternatives to finite differences, 5th IFAC Symposium on Fractional Differentiation and Its Applications-FDA2012, Hohai University, Nanjing, China, 14-17 May 2012.

C. Piret, J.-F. Remacle and E. Marchandise, Mesh and CAD Repair Based on Parametrizations with Radial Basis Functions, Proceedings of the 20th International Meshing Roundtable 2012, Part 6, 419-436, DOI: 10.1007/978-3-642-24734-7_23

J. Schmidt, **C. Piret**, B. Kadlec, D. Yuen, E. Sevre, N. Zhang, Y. Liu, “Simulating tsunami Shallow-Water Equations with Graphics Accelerated Hardware (GPU) and Radial Basis Functions (RBF)”, in proceedings of the South China Sea Tsunami Workshop 2008, SCSTW 2008. Shanghai, China, December 2008.

IN PREPARATION

C. Piret, N. Dissanayake, J. Gierke and B. Fornberg, The Radial Basis Functions Method for Improved Numerical Approximations of Geological Processes in the presence of fractures.

C. Piret, Fast Orthogonal Gradients Method.

B. Adcock, D. Huybrechs, **C. Piret**, RBF-based Frame theory.

G. Ierley, **C. Piret**, On enhancing the resolution of autochromes using the RBF method.

C. Piret, E. Hanert, E. Larsson and S. Kumar, A Radial Basis Functions method for fractional diffusion equations in two spatial dimensions, to be submitted.

TALKS AND
POSTERS

“Computation of Fractional Derivatives of Analytic Functions”, Numerical Analysis in the 21st Century, Numerical Analysis in the 21st Century, in honour of Nick Trefethen's retirement from Oxford, Oxford, August 16th 2023.[Plenary Speaker]

“Modeling SARS-CoV-2 Spreading on University Campuses”, ACS Spring 2021, 5 April 2021.[Invited Speaker]

“A Fast Radial Basis Functions Method for Solving Partial Differential Equations on Arbitrary Surfaces”, Virtual International Conference on Physical Science (SVNIT) Surat, February 6th 2021.[Invited Speaker]

“RBFs for Solving PDEs on Arbitrary Surfaces”, Online International Workshop on Radial Basis Functions, Iran, 16–19 June 2020.[Invited Speaker]

“Advances on Embedding Methods for Solving PDEs on Arbitrary Surfaces using RBFs”, CSE, Spokane, USA, March 2019.[Invited Speaker]

“The Fast RBF OGr methods for solving PDEs on arbitrary surfaces”, ICOSAHOM, London, UK, July 2018.

“The Fast RBF OGr methods for solving PDEs on arbitrary surfaces”, Applied Math Seminar, Claremont Center for the Mathematical Sciences, Claremont McKenna College, CA, November 13th, 2017. [Invited Speaker]

“The Fast RBF OGr methods for solving PDEs on arbitrary surfaces”, SCAN Seminar, Cornell, October 30th, 2017. [Invited Speaker]

“The RBF-FD method applied to two problems: Groundwater Flow Modelling and Solving PDEs on Arbitrary Surfaces.”, Localized Kernel-Based Meshless Methods for Partial Differential Equations, ICERM, August 8th, 2017. [Invited Speaker]

“RBF methods for solving PDEs on arbitrary surfaces”, Workshop on Numerical Methods for PDEs on Surfaces, Loon Lake, Vancouver, Canada, June 12th 2017. [Invited Speaker]

“An Introduction to RBFs”, PIMS-SFU Undergraduate Summer School: Scientific Computing on Curved Surfaces, SFU, Vancouver, Canada, June 8th and 9th 2017. [Guest Lecturer]

“Frames for Bypassing the Runge Phenomenon”, Numerical Analysis Group Internal Seminar, Mathematical Institute, Oxford, UK, May 8th 2017.

“The fast radial basis functions orthogonal gradients method for solving PDEs on arbitrary surfaces”, NUMTA2016, Numerical Computations: Theory and Algorithms, Pizzo Calabro, June 21st 2016.

“The fast radial basis functions orthogonal gradients method for solving PDEs on arbitrary surfaces”, 15th International Conference in Approximation Theory, San Antonio, Texas, May 23rd 2016.

“Solving PDEs on arbitrary surfaces using the fast RBF orthogonal gradients method”, Colloquium of the Applied Mathematics Department, September 2015, CU Boulder, USA [Invited Talk]

“The fast radial basis functions orthogonal gradients method for solving PDEs on arbitrary surfaces”, New Directions in Numerical Computation, 25-28 August 2015: In Celebration of Nick Trefethen's 60th Birthday, Oxford, UK

“An RBF-based Frames Strategy for Bypassing the Runge Phenomenon”, SIAM Conference on Computational Science, Salt Lake City, Utah, USA, March 2015

“An RBF-based Frames Strategy for Bypassing the Runge Phenomenon”, Simon Fraser University, Scientific Computing Seminar, Vancouver, Canada, December 2014 [Invited Talk]

“A RBF Method For Solving fractional partial differential equations in one and two spatial dimensions”, Mathematical and numerical modeling in finance, Mittag-Leffler Institute, Djursholm, Sweden, June 2014

“A fast radial basis functions method for solving PDEs on arbitrary surfaces”, ICOSAHOM, Salt Lake City, Utah, USA, June 2014

“A RBF Method For Solving fractional partial differential equations in one and two spatial dimensions”, ICOSAHOM, Salt Lake City, Utah, USA, June 2014

“A fast radial basis functions method for solving PDEs on arbitrary surfaces”, 8th International Conference on Curves and Surfaces, Paris, France, June 2014 [Invited Talk]

“A Novel Radial Basis Functions Method for Solving Fractional Diffusion Equations”, SIAM Annual Meeting, San Diego, USA, July 8th 2013 [Invited Talk]

“A Radial Basis Functions Method for Solving Fractional Diffusion Equations”, Departmental Seminar, Department of Information Technology, University of Uppsala, SE, September 25th 2012 [Invited Talk]

“The Orthogonal Gradients Method: A RBF Method for Solving PDEs on Arbitrary Surfaces”, Computational Mathematics and Applications Seminar, Mathematical Institute, University of Oxford, UK, May 3rd 2012 [Invited Talk]

“Remeshing Techniques Using the Radial Basis Functions Method”, Fifth International Conference on Advanced COmputational Methods in ENgineering (ACOMEN 2011), Liege, Belgium, 14-17 November 2011 [Talk]

“Mesh and CAD Repair Based on Parametrizations with Radial Basis Functions”, 20th International Meshing Roundtable, October 23-26, 2011 [Talk]

“Solving Partial Differential Equations on Arbitrary Surfaces using the Radial Basis Functions Method”, Seminars in Systems and Control, Université catholique de Louvain, Louvain-La-Neuve, May 2011 [Invited Talk]

“A Novel Multilevel Iterative Radial Basis Functions (RBF) Scheme for Solving Elliptic Equations”, 7th International Conference on Curves and Surfaces, Avignon, France, June 2010 [Invited Talk]

“A new Radial Basis Functions (RBF)-based Ghost Fluid Method”, Duke University, NC, USA, March 2010 [Talk]

“Overcoming the Gibbs Phenomenon Using The Ghost Layer Method”, University of Oxford, UK, November 2009 [Talk]

“Overcoming the Gibbs Phenomenon Using a Modified Radial Basis Functions (RBF) Method”, 23rd Biennial Conference on Numerical Analysis, Glasgow, Scotland, June 2009 [Talk]

“The Radial Basis Functions (RBF) Method applied to solving partial differential equations (PDEs) on the surface of the sphere”, Earthquake Research Institute, Tokyo, Japan, October 2008 [Invited talk]

“La Méthode des Fonctions de Base Radiale appliquée à l'équation d'advection sur la sphère”, Facultés Notre-Dame de la Paix à Namur, Namur, Belgium, May 2008 [Invited talk]

“On Choosing a Radial Basis Function and a Shape Parameter When Solving a Convective PDE on a Sphere”, Atmospheric and Oceanic Sciences Student Poster Conference, Boulder, CO, October 2007 [Poster]

“The Role of the Shape Parameter for Different RBF Methods When Solving a Convective-Type PDE”, 22nd Biennial Conference on Numerical Analysis, Dundee, Scotland, June 2007 [Talk]

“The RBF-QR Method”, SIAM meeting (Grad Student Chapter), Boulder, CO, February 2007 [Talk]

“Locality Properties of RBF Expansion Coefficients”, 6th International Conference on Curves and Surfaces, Avignon, France, June 2006 [Talk]