Cécile Piret

CONTACT INFORMATION

Department of Mathematical Sciences
Michigan Technological University
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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 partial differential equations. In particular, I have been focusing on techniques based on the Radial Basis Functions (RBF) method. The application areas range from computational fluid dynamics to atmospheric and oceanic sciences.

EDUCATION

University of Colorado at Boulder, USA

Ph.D., Department of Applied Mathematics, May 2008

- Dissertation: Analytical and Numerical Advances in Radial Basis Functions
- Advisor: Professor Bengt Fornberg

M.S., Department of Applied Mathematics, May 2005

- Area of Study: Numerical Analysis

Metropolitan State College of Denver, USA

B.S., Department of Mathematical and Computer Sciences, May 2002

- Major in Applied Mathematics, emphasis on Computer Science (*Summa cum Laude*)

PROFESSIONAL EXPERIENCE

Michigan Technological University, USA, Department of Mathematical Sciences

Assistant Professor
(Tenure Track Position) **August 2014 to Present**

Classes taught

Calculus 1 for engineers *(Fall 2014)*
Complex Variables *(Spring 2015)*
Calculus 3 for engineers *(Fall 2015)*

Université catholique de Louvain, BE, Unité de Mécanique Appliquée

Chargée de Recherches FNRS
(3-year Assistant Professorship) **October 2012 to August 2014**

Post-doctoral Researcher **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

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

References

Prof Bengt Fornberg University of Colorado, Boulder, USA (Bengt.Fornberg@colorado.edu)

Dr Natasha Flyer National Center for Atmospheric Research, Boulder, USA (flyer@ucar.edu)

Prof Emmanuel Hanert Université catholique de Louvain, Belgium (Emmanuel.Hanert@uclouvain.be)

Prof Elisabeth Larsson Uppsala Universitet, Sweden (Elisabeth.Larsson@it.uu.se)

Languages

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

Programming: Java, C++, MATLAB

Publications

C. Piret, An RBF-based Frames Strategy for Bypassing the Runge Phenomenon, Submitted at the SIAM Journal on Scientific Computing.

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), A1797A1812.

C. Piret and E. Hanert, A Radial Basis Functions method for fractional diffusion equations, Journal of Computational Physics 238 (2013) pp. 71-81

E. Marchandise, **C.Piret** and J.-F. Remacle, CAD and mesh repair with Radial Basis Functions, Journal of Computational Physics 231 (2012) pp. 2376-2387

C. Piret,The Orthogonal Gradients Method: a Radial Basis Functions Method for Solving Partial Differential Equations on Arbitrary Surfaces, Journal of Computational Physics, 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), Concurrency and Computation: Practice and Experience, 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, Journal of Computational Physics, 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 Journal of Numerical Analysis 28 (2008), pp. 121-142

B. Fornberg and **C. Piret**, A stable algorithm for flat radial basis functions on a sphere, SIAM Journal on Scientific Computing 30 (2007), pp.60-80

Peer-Reviewed Conference Publications

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, The Fast Orthogonal Gradients Method: a Radial Basis Functions Method for Solving Partial Differential Equations on Arbitrary Surfaces, to be submitted.

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

C. Piret and A. St-Cyr, A novel multilevel iterative Radial Basis Functions (RBF) scheme for elliptic equations, to be submitted.

Talks and posters

"The fast radial basis functions orthogonal gradients method for solving PDEs on arbitrary surfaces", 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]