

# Annalisa Buffa

## Curriculum Vitae

Lausanne, August 2018

### Research interests

**Main research field:** numerical analysis, discretization of partial differential equations.

**Main keywords:** Isogeometric analysis, fully compatible discretization of PDEs, linear and non linear elasticity, contact mechanics, integral equations on nonsmooth manifolds, functional theory for Maxwell equations in non-smooth domains, finite element techniques for Maxwell equations, non-conforming domain decomposition methods, asymptotic analysis, stabilization techniques for finite element discretizations.

### Current position

09/2016– **Full Professor, Chair of Numerical Modeling and Simulation**, *Institute of Mathematics, Ecole Polytechnique Fédérale de Lausanne (EPFL)*, Switzerland.

2004– **Research Director (on leave since 09/2016)**, *Istituto di Matematica Applicata e Tecnologie Informatiche “E. Magenes”*, Consiglio Nazionale delle Ricerche (CNR), Pavia.

2013–2019 **Habilitated as full professor in numerical analysis by the Italian ASN.**

### Previous positions and research experiences

2004–2016 **Research Director**, *Istituto di Matematica Applicata e Tecnologie Informatiche “E. Magenes”*, Consiglio Nazionale delle Ricerche (CNR), Pavia.

2013–2016 **Director of the *Istituto di Matematica Applicata e Tecnologie Informatiche “E. Magenes”***, *Consiglio Nazionale delle Ricerche (CNR)*, Italy.  
Pavia, Milano, Genova sections - about 70 employees

Fall 2005 **Invited researcher**, *Institute for Computational Engineering and Sciences (ICES)*, *University of Texas at Austin*, USA, (3 months).  
Tinsley Oden Faculty Fellowship Research Program

Fall 2004 **Invited researcher**, *Institute for Computational Engineering and Sciences (ICES)*, *University of Texas at Austin*, USA, (2 months).  
Tinsley Oden Faculty Fellowship Research Program

Spring 2004 **Invited professor**, *Laboratoire J.L. Lions*, *Université Pierre et Marie Curie*, Paris, France, (7 months).

2001–2004 **Researcher**, *Istituto di Matematica Applicata e Tecnologie Informatiche “E. Magenes”*, Consiglio Nazionale delle Ricerche (CNR), Pavia.

2002–2003 **Invited researcher**, *Centre de Mathématiques Appliquées, École Polytechnique*, Palaiseau, France, (1 year).

2001–2002 **CNRS researcher**, *Laboratoire d'Analyse Numérique*, *Université Pierre et Marie Curie*, Paris, France, (9 months).

2001 **Post-Doctoral Fellow**, *Seminar für Angewandte Mathematik*, *ETH*, Zürich, Switzerland, (9 months).

## Education

- 2000 **Ph.D in Mathematics**, *University of Milano*, Italy.  
Title: Some numerical and theoretical problems in computational electromagnetism.  
Advisor: F. Brezzi
- 1996 **M.Sc. in Computer Science Engineering**, *University of Pavia*, Italy,  
GRADE: 110/110 cum laude and honors.  
Title: Filtraggio di immagini e problemi di evoluzione non lineare.  
Advisor: F. Brezzi

## Memberships, awards and special lectures

- 2020- M  
ember of the Gruppo 2003.                    2019 Highly Cited Researcher 2019, Cross-field, Web of Science
- 2018- Corresponding member of the Accademia dei Lincei
- 2016- Member of the Academia Europaea
- 08/2015 **Collatz prize** by ICIAM, <http://www.iciam.org/iciam-prizes-2015>
- 11/2014 The **Aziz Lecture**, Department of Mathematics, University of Maryland, USA
- 5/2014 **Premio Sgarlata**, nomination of the president of CNR, Luigi Nicolais
- 10/2013 **Premio Ghislieri** for mathematical sciences.
- 09/2007 **Bartolozzi Prize**, *Unione Matematica Italiana*.
- 02/2007 **John Todd Fellowship Prize**, Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- 1991-2000 During my studies, I was awarded a number of fellowships by e.g., Istituto Lombardo Accademia di Scienze e Lettere and SIMAI (Italian Society of Applied and Industrial Mathematics) and I was a fellow of Collegio Ghislieri.

## ERC grants

- 2016-2020 **ERC Advanced Research Grant**, awarded by the European Research Council for the project CHANGE: *New Challenges for (adaptive) PDE solvers: the interplay of ANalysis and GEometry* .
- 2009-2014 **ERC Starting Independent Research Grant**, awarded by the European Research Council for the project GEOPDES: *Innovative compatible discretization techniques for Partial Differential Equations*.

## Plenary lectures

- 2020 **Panorama of Mathematics**, Hausdorff Center, Bonn, Germany, October.
- 2020 **Mathematics without borders: the centennial of the International Mathematical Union**, Strasbourg, France, September.
- 2020 **DMV Jahrestagung 2020**, Chemnitz, Germany, September.
- 2019 **Symposium on Solid and Physical Modeling**, Vancouver, Canada, June.
- 2018 **The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications**, Taipei, Taiwan, July.
- 2016 **Bi-annual congress of the Italian Society of Industrial and Applied Mathematics (SIMAI)**.  
Milano, September
- 2016 **The European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS)**.  
Semi-plenary speaker, Crete, Greece, June
- 2015 **8th International Congress on Industrial and Applied Mathematics (ICIAM 2015)**.  
Beijing, China, August

- 2014 **Foundations of Computational Mathematics conference (FoCM).**  
Montevideo, Uruguay, December
- 2014 **International Congress of Mathematicians (ICM).**  
45 minutes lecture, Section 15, Seoul, South Korea, August
- 2014 **GAMM Annual Meeting.**  
Erlangen-Nuremberg, Germany, March
- 2013 **The Mathematics of Finite Elements and Applications (MAFELAP).**  
Brunel University, London, UK, June
- 2013 **14th International Conference on Approximation Theory.**  
San Antonio, Texas, April
- 2012 **The European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS).**  
Semi-plenary speaker, Vienna, Austria, September
- 2010 **Curves and Surfaces.**  
Avignon, France, June
- 2010 **Third Chilean Workshop on Numerical Analysis of Partial Differential Equation.**  
Concepcion, Chile, January
- 2009 **23rd Biennial Numerical Analysis Conference.**  
Glasgow, UK, July
- 2009 **SMAI Conference.**  
Colle de Loup, Nice, France, May
- 2008 **Fifth European Congress of Mathematics.**  
"Invited parallel lecture" (45 minutes), Amsterdam, The Netherlands, June
- 2007 **XVIII Congress of Unione Matematica Italiana.**  
Bari, Italy, September
- 2007 **8th International Conference on Mathematical and Numerical Aspects of Waves (WAVES).**  
Reading, UK, July
- 2007 **International Conference on Scientific Computation And Differential Equations (SciCADE).**  
Saint-Malo, France, June
- 2005 **XIX Congreso de ecuaciones diferenciales y aplicaciones (CEDYA).**  
Madrid, Spain, April
- 2005 **The European Conference on Numerical Mathematics and Advanced Applications (ENUMATH).**  
Santiago de Compostela, Spain, July
- 2001 **GAMM-Workshop: Computational electromagnetics.**  
Kiel, Germany, October
- 2000 **Convegno RIFORMA.**  
Genova, Italy, May
- 1999 **Twelve International Conference on Domain Decomposition (DD12).**  
Chiba, Japan.

## Invited lectures and seminars

### Invited Lectures in Workshops and Colloquia

- 2020 **Isaac Newton Institute of Mathematical Sciences, *Within the programme: Geometry, compatibility and structure preservation in computational differential equations***, Cambridge, July.

- 2020 **FoCM conference, Foundations of Numerical PDEs workshop**, Vancouver, Canada, June.
- 2019 **High-Order Finite Element and Isogeometric Methods Workshop - HOFEIM**, Pavia, Italy, September.
- 2017 **Stepping Stone symposium on Theoretical and Numerical Analysis of PDEs.**  
Université de Geneve, Switzerland
- 2017 **MFET: Modern Finite Element Technologies.**  
Bad Honnef, Germany
- 2014 **The Aziz Lecture, Department of Mathematics.**  
University of Maryland
- 2014 **Conference on Numerical Analysis and Scientific Computing.**  
Max Planck Institute for Mathematics, Leipzig, Germany
- 2013 **Swiss Numerical Analysis Colloquium.**  
Lausanne, Switzerland.
- 2013 **Computational Electromagnetism.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany
- 2012 **High-Order Numerical Approximation for Partial Differential Equations**, workshop, Bonn, Germany.
- 2011 **Higher Order Finite Element and Isogeometric Methods (HOFEIM)** .  
Cracow, Poland, June.
- 2011 **Journées Lions-Magenes.**  
UPMC Paris, France.
- 2011 **Foundations of Numerical PDEs.**  
within the FoCM Conference, Budapest, Hungary.
- 2009 **Compatible and innovative discretizations for PDEs.**  
a workshop on the occasion of Ragnar Winther's 60th birthday, Oslo, Norway.
- 2007 **High-order methods for computational wave propagation and scattering.**  
AIM Research Conference Center (ARCC), Palo Alto, California.
- 2007 **Computational Electromagnetism and Acoustics.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- 2006 **Advances in Computational Scattering.**  
Birs Symposium: Banff, Alberta, Canada.
- 2005 **International Conference on Electromagnetics in Advanced Applications.**  
*Invited Session Computation Electromagnetics*, Turin, Italy.
- 2005 **New trends in Simulation and Control of PDEs.**  
WIAS Institute, Berlin, Germany.
- 2004 **Computational Electromagnetism.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- 2002 **New trends in boundary elements.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- 2002 **Analytical and numerical treatment of singularities in partial differential equations.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- 2002 **Problems in electromagnetism.**  
Università degli Studi di Trento, Italy.
- 2000 **Colloquium CRESPO** .  
ENSTA-INRIA, Paris, France.

- 1999 **Domain decomposition and multifields theories.**  
Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- Invited seminars (incomplete list)
- 2018 Colloquium of the Laboratoire Jacques Louis Lions, Paris
- 2018 Lecons Jacques-Louis Lions 2018, Laboratoire Jacques Louis Lions, Paris
- 2017 Max-Planck Institute of Mathematics in the Sciences, Leipzig
- 2016 TU Berlin, Department of Mathematics
- 2015 Dipartimento di Matematica, Università di Firenze
- 2015 Ecole Polytechnique Fédérale de **Lausanne**
- 2014 ICES, University of Texas at **Austin**.
- 2014 TU of **Darmstadt**, Germany.
- 2012 Robert Bosch GmbH, Corporate Research, **Stuttgart**, Germany.
- 2012 Universität **Zürich**, Institut für Mathematik, Switzerland.
- 2011 Seminar für Angewandte Matematik, ETH, **Zürich**, Switzerland.
- 2009 INRIA, **Rocquencourt**, France.
- 2009 Laboratoire Jacques Louis Lions, **Paris**, France.
- 2008 Department of Mathematics, **Penn State** University, USA.
- 2008 Institut für Geometrie und Praktische Mathematik, RWTH **Aachen**, Germany.
- 2006 School of Mathematics, University of Minnesota, **Minneapolis**, USA.
- 2006 Department of Mathematics and Statistics, McGill University, **Montreal**, Canada.
- 2005 Department of Applied Mathematics and Theoretical Physics Centre for Mathematical Sciences, University of **Cambridge**, England.
- 2005 Electrical Engineering Department, Università degli Studi di **Pisa**, Italy.
- 2005 Centre of Mathematics for Applications, University of **Oslo**, Norway.
- 2004 Universität **Zürich**, Institut für Mathematik, Switzerland.
- 2004 Centre of Mathematics for Applications, University of **Oslo**, Norway.
- 2003 ICES Institute for Computational Engineering and Sciences, University of Texas at **Austin**.
- 2003 Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, **Paris**, France.
- 2002 Institut für Geometrie und Praktische Mathematik, RWTH **Aachen**, Germany.
- 2002 CERMICS, **Marne-la-Vallée**, France.
- 2002 Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, **Paris**, France.
- 2001 Dipartimento di Matematica, Università degli studi di **Trento**, Italy.
- 1999 Seminar für Angewandte Matematik, ETH, **Zürich**, Switzerland.
- 1999 Mathematisches Institut, Universität **Tübingen**, Germany.
- 1999 École Polytechnique Fédérale de **Lausanne**, Switzerland.
- 1998 Mathematisches Institut, Universität **Augsburg**, Germany.

## Teaching

### Undergraduate and M.Sc. level

- 2018- Lecturer, *EPFL*, Course: “Numerical Methods for Saddle Point Problems”, M.Sc. (every year)
- 2018- Lecturer, *EPFL*, Course: “Analyse Numérique”, for mathematics, Bachelor (every year)
- 2017- Lecturer, *EPFL*, Course: “Analyse I” for engineering, Bachelor (every year)
- 2017 Lecturer, *EPFL*, Course: “Numerical methods for electromagnetics”, M.Sc .
- 2017 Lecturer, *EPFL*, Course: “Analyse Numérique” , for mechanical engineering, Bachelor.

- 2016 Lecturer, *EPFL*, Course: “Analyse I” for electrical engineering, Bachelor.
- 2010 Lecturer, *Università degli Studi di Pavia, science faculty*, Course: “Calcolo Numerico per le scienze chimiche” for students in chemistry.
- 2009 Lecturer, *Università degli Studi di Pavia, science faculty*, Course: “Calcolo Numerico per le scienze chimiche” for students in chemistry.
- 2007 Lecturer, *Università degli Studi di Pavia, science faculty*, Course: “Istituzioni di Matematiche” for students in biology.
- 2006 Lecturer, *Università degli Studi di Pavia, science faculty*, Course: “Istituzioni di Matematiche” for students in biology.
- 2004 Lecturer, *Université Pierre et Marie Curie, Paris VI*, Course: DEUG SCM13 “Algèbre”.
- 2001 Head Assistant, *Seminar für Angewandte Mathematik*, ETH, Zürich, Switzerland. Course: Linear Algebra.
- 1996-2000 Head Assistant, *Università degli Studi di Pavia, Engineering school*, Pavia, Italy. One course per year: Calculus A, Calculus B.

### Lectures in Ph.D. schools and courses

- 2020 EPFL Doctoral school in mathematics. Course: “Integral equations and boundary element method”
- 2015 CEA-EDF-INRIA School on “New Trends in Compatible Discretizations”, Paris, France.
- 2012 Isogeometric compatible discretizations, CIME Summer School, Cetraro Italy.
- 2011 Mixed finite elements: theory and applications, Ph.D course, Department of Mathematics, Pavia, joint with C. Lovadina.
- 2010 Elementi di Calcolo Esterno Discreto, Ph.D. course, Department of Mathematics, Pavia
- 2004 Domain decomposition techniques for elliptic problems, Ph.D. course, Department of Mathematics, Pavia
- 2003 Boundary integral equation methods for the Maxwell equations, Ph.D. Course, Institut für Angewandte Analysis und Numerische Simulation, Stuttgart
- 2001 Time harmonic Maxwell Equations: theory and numerics, Ph.D. and M.Sc. course, Seminar für Angewandte Mathematik, ETH, Zürich, Switzerland.

## Student advising

### Ph.D. Students

- 2017- Ondine Chanon, Thesis subject: *Adaptive isogeometric analysis*, EPFL, Ecole Doctoral Mathématiques, starting September 2017.
- 2017- Luca Coradello, Thesis subject: *Isogeometric analysis for layered anisotropic thick shells*, EPFL, Ecole Doctoral Mécanique, started February 2017.
- 2016- Riccardo Puppi, Thesis subject: *Isogeometric analysis on trimmed domains*, EPFL, Ecole Doctoral Mathématiques, started December 2016.
- 2012-2016 Ericka Brivadis, Thesis subject: *Isogeometric contact mechanics*, Istituto Universitario di Studi Superiori, Pavia, Italy. In collaboration with Michelin, Centre de Technologies de Ladoux, France.
- 2009-2013 Andrea Bressan. Thesis subject: *Isogeometric methods for saddle point problems*, Università degli Studi di Pavia. Co-advisor: Giancarlo Sangalli. Now post-doc at the University of Oslo.
- 2003-2009 Paola Antonietti. Thesis subject: *Domain Decomposition techniques and Preconditioning for the Discontinuous Galerkin method*, Università degli Studi di Pavia. Co-advisor: Ilaria Perugia. Now associate professor at Politecnico di Milano

### Post doctoral students

- Since 2020 Thibault Hirschler.

- Since 2018 Xiaodong Wei. *Isogeometric methods on Vreps*
- 2015-2017 Mathieu Fabre. *Isogeometric algorithms for contact mechanics*. Now working at ESI Group, Lyon
- 2016-2017 Hongmei Kang. *Trimming and multipatch implementation and testing*. Now assistant professor at the Nakai University
- 2015-2016 Federico Marini. *Mortar methods for non linear mechanics*
- 2014-2015 Eduardo Garau. *Adaptive hierarchical spline methods*. Assistant professor, University of Santa Fe, Argentina
- Since 2013 Pablo Antolín. *Isogeometric analysis for large deformations*.
- 2012-2013 Sebastian Pauletti. *Geometric equations via Isogeometric Analysis*. Now assistant professor, University of Santa Fe, Argentina
- 2010-2014 Massimiliano Martinelli. *Development of a C++ Isogeometric Code*. Now researcher at IMATI-CNR
- 2008-2011 Rafael Vázquez. *Isogeometric analysis in electromagnetics*. Now researcher at IMATI-CNR
- 2008-2010 Durkbin Cho. *The use of T-splines in isogeometric analysis*. Now assistant professor at the Dongguk University, Seoul
- 2009-2010 Carlo De Falco. *Isogeometric analysis for saddle point problems*. Now associate professor at Politecnico of Milano
- 2009-2010 Mukesh Kumar. *Computation aspects of Isogeometric analysis*. Now post-doc in SINTEF, Norway

## Professional activities

### Editorial activity

- Since 2015 SIAM Journal Numerical Analysis, Editor
- 2014-2017 JEMS Journal of the European Mathematical Society, Editor.
- Since 2014 Book series: EMS Series in Industrial and Applied Mathematics, Editor.
- 2013-2018 ESAIM: Mathematical Modelling and Numerical Analysis, **Editor In-Chief**.
- Since 2008 Bollettino dell'Unione Matematica Italiana, Associate Editor.
- Since 2007 IMA Journal of Numerical Analysis, Associate Editor.

### Participation to committees

- Since 2019 Structure22 panel of the International Mathematical Union, IMU
- Since 2017 Scientific committee of the Ecomas thematic conferences on isogeometric analysis
- 2017 Member of the ERC advanced grant panel PE1
- Since 2016 Member of the scientific board for the ECCOMAS thematic conference, Modern Finite Element Technologies - Mathematical and Mechanical Aspects"
- Since 2015 Member of the scientific committee for the ICOSAHOM Conferences
- 2015-2017 Member of the scientific committee for Fondation Sciences Mathématiques de Paris (FSMP)
- Since 2014 Member of the scientific committee for the PhD program in Mathematics and Statistics, Università di Pavia
- 2014-2016 Member of the **scientific committee, 7th European Congress of Mathematics (7ECM)**.
- 2013-2014 Member of the ENGITECH Committee, *Science Europe*.
- 2013-2014 Member of the Scientific Committee for the Curves and Surfaces, Paris, June 2014.
- Since 2012 Member of the Scientific Committee for the WAVE Conferences
- 2012-2013 Member of the Scientific Committee for the ENUMATH Conference, EPFL, Lausanne, August 2013.
- Since 2011 **Member-at-large of the Board of Directors of FoCM**, Foundation of Computational Mathematics.

- 2010-2014 Member of the teaching committee of the I.U.S.S. Ph.D. program "Computational mechanics and advanced materials".
- 2011 Member of the Conference Committee of the 15th International Symposium on Applied Electromagnetics and Mechanics, Naples.
- 2010-2016 **Member of Standing Committee on Applied Mathematics of EMS.**
- 2009 Member of the evaluation panel for *Mathematics and ...*, Vienna Science and Technology Fund.
- 2008-2012 Member of the Scientific Users Committee (SCUC) per Zentralblatt/ZMATH.
- 2007 Member of the committee for the Ph.D. grants competitions, Pavia.
- Since 2004 Member of the committee for the employment of researchers within the CNR.

#### Main reviewer activity

- 2017 Chair of the evaluation panel for the INRIA Theme : Numerical Schemes and Simulation
- 2013 Reviewer of the INRIA Theme: Computational Models and Simulation, 13 research teams.
- Since 2011 Reviewer for the European Research Council (ERC).
- Since 2008 Reviewer for the Austrian Science Fund.
- Since 2008 Reviewer for the Suisse National Science Foundation (SNSF).
- Since 2007 Reviewer for the FONDECYT (Chilean Research Fund Council).

#### Organization of invited sessions, workshops and conferences

- 2020 Workshop *Foundations of Numerical PDEs*, within FoCM Conference, Vancouver, June. Co-organizers: E. Tadmor, R.J. Leveque
- 2019 Co-organizer of the Oberwolfach workshop 1929b: Mathematical Foundations of Isogeometric Analysis. Co-organizers: C. Manni, A. Kunothe, T. J.R. Hughes
- 2018 Co-organizer of the Oberwoldach workshop 1843: Computational Engineering. Co-organizers: O. Allix, C. Carstensen, J. Schroeder
- 2018 ESI Thematic programme on Numerical analysis of complex PDE models in the sciences, Vienna, June 11-August 17, 2018. Co-organizers: I. Perugia, M. Melenk, Ch. Schwab, T. Hou
- 2017 Co-chair of the *V International Conference on Isogeometric Analysis, IGA 2017*, Pavia, September 11-13, 2017. Co-chairs: A. Reali, G. Sangalli, F. Auricchio.
- 2017 Workshop *Foundations of Numerical PDEs*, within FoCM Conference, Barcelona, July. Co-organizers: R. Nochetto and E. Suli.
- 2014 Workshop *Multiresolution and adaptivity in numerical PDEs*, within FoCM Conference, Montevideo, December. Co-organizers: A. Kunothe and P. Morin.
- 2014 Invited session on *isogeometric methods* at Curves and Surfaces, Paris, June.
- 2012 CIME Summer School: *Isogeometric Analysis: a new paradigm in the numerical approximation of PDEs*, Cetraro (CS), Italy. Co-organizer: G. Sangalli.
- 2011 Workshop *Multiresolution and adaptivity in numerical PDEs*, within FoCM Conference, Budapest, Hungary. Co-organizer: A. Kunothe.
- 2010 Workshop *Non-Standard Numerical Methods for PDEs*, Pavia, Italy. Co-organizers: D. Boffi, C. Lovadina, I. Perugia, G. Sangalli.
- 2010 INDAM "Trimestre Intensivo": *Innovative Numerical Methods for PDE's*. Co-organizers: D. Boffi, I. Perugia, G. Sangalli.
- 2006-2008 Organizer of the Applied Mathematics Seminars, IMATI-CNR, Pavia, Italy.
- 2005 Member of the Organizing Committee for the Third Finite Element Fair, Pavia, Italy.
- 2001 Member of the Organizing Committee for the ENUMATH Conference, Ischia, Italy.
- 2001- I constantly organize several minisymposia or invited sessions at international conferences.



## Research Funding (since 2009)

- 2020-2024 **Design-thorough-Analysis: the litmus test**, Suisse National Science foundation, SNSF, under the action BRIDGE.
- 2020-2024 **FET-open Challenging Current Thinking, RIA**, awarded by the EU-H2020 for the project n. 862025: *Analysis, Design, and Additive manufacturing using microstructures, ADAM<sup>2</sup>*.
- 2016-2021 **ERC Advanced Research Grant**, awarded by the European Research Council for the project: CHANGE: *New CHallenges for (adaptive) PDE solvers: the interplay of ANalysis and GEometry* .
- 2015-2019 **EU H2020 Factory of the Future**, project n. 680448, CAxMAN: *Computer Aided Technologies for Additive Manufacturing*. Role: Unit coordinator (Pavia). Coordinator: SINTEF, Norway.
- 2015-2017 Research contract with **Michelin, Centre de Technologies de Ladoux**, France. Title: *Isogeometric methods*. Role: Principal Investigator.
- 2013-2017 Research contract with **TOTAL Scientific division & Hutchinson SA Direction R & D Centre de Recherche**, France. Title: *An innovative solver for large deformation problems*. Role: Principal Investigator (with G. Sangalli). Partners: G. Elber Technion (Haifa) and F.X. Roux LJLL (Paris)
- 2013-2016 Research contract with **Michelin, Centre de Technologies de Ladoux**, France. Title: *Isogeometric methods for contact mechanics*. Role: Principal Investigator.
- 2012-2013 Research contract with **TOTAL Scientific division**, France. Title: *Isogeometric methods for large deformations*. Role: Principal Investigator (with G. Sangalli).
- 2011-2012 Research contract with **Hutchinson SA Direction R & D Centre de Recherche**, France. Title: *Isogeometric methods for large deformations*. Role: Principal Investigator (with G. Sangalli and A. Reali).
- 2011-2014 **FoF ICT-2011.7.4 Digital factories**. Project *Towards Enhanced Integration of Design and Production in the Factory of the Future through Isogeometric Technologies*. 2011-2015. Role: participant. Coordinator: SINTEF, Norway.
- 2010-2014 FIRB - Futuro in Ricerca. Project *Isogeometric Discretizations in Continuum Mechanics* 2010-2014. Role: Participant. PI: Giancarlo Sangalli.
- 2009-2014 **ERC Starting Independent Grant 2008-2013**, GEOPDES n. 205004. *Innovative compatible discretization techniques for Partial Differential Equations*. Principal Investigator.

## Publications

### Journal papers

- [1] P. ANTOLIN, A. BUFFA, L. CORADELLO, *A hierarchical approach to the a posteriori error estimation of isogeometric Kirchhoff plates and Kirchhoff–Love shells*. *Comput. Methods Appl. Mech. Engrg.* 363 (2020).
- [2] A. BUFFA, J. DÖLZ, S. KURZ, S. SCHP̄S, R. VÀZQUEZ, F. WOLF *Multipatch approximation of the de Rham sequence and its traces in isogeometric analysis*. *Numer. Math.* 144 (2020), no. 1, 201–236.
- [3] P. ANTOLIN, A. BUFFA, M. MARTINELLI *Isogeometric analysis on V-reps: first results*. *Comput. Methods Appl. Mech. Engrg.* 355 (2019), 976–1002.
- [4] C. BRACCO, A. BUFFA, C. GIANNELLI, R. VÀZQUEZ *Adaptive isogeometric methods with hierarchical splines: an overview*. *Discrete Contin. Dyn. Syst.* 39 (2019), no. 1, 241–261.
- [5] P. ANTOLIN, A. BUFFA, M. FABRE *A priori error for unilateral contact problems with Lagrange multipliers and isogeometric analysis* *IMA J. Numer. Anal.*, . *IMA J. Numer. Anal.* 39 (2019), no. 4, 1627–1651
- [6] A. BUFFA, E. GARAU *A Posteriori Error Estimators for Hierarchical B-Spline Discretizations*, *Math. Models Methods Appl. Sci.* 28 (2018), no. 8, 1453–1480.
- [7] A. BUFFA, C. GIANNELLI *Adaptive isogeometric methods with hierarchical splines: optimality and convergence rates*. *Math. Models Methods Appl. Sci.* 27 (2017), no. 14, 2781–2802.
- [8] A. BUFFA, E. GARAU *Refinable spaces and local approximation estimates for hierarchical splines*, *IMA J. Numer. Anal.* 37 (2017), no. 3, 1125–1149.
- [9] P. ANTOLIN , A. BRESSAN , A. BUFFA, G. SANGALLI *An isogeometric method for linear nearly-incompressible elasticity with local stress projection*, *Comput. Methods Appl. Mech. Engrg.* 316 (2017), 694–719.
- [10] A. BUFFA, C. GIANNELLI, P. MORGENSTERN, D. PETERSEIM *Complexity of hierarchical refinement for a class of admissible mesh configurations*, *Comput. Aided Geom. Design* 47 (2016), 83–92.
- [11] A. BUFFA, C. GIANNELLI *Adaptive isogeometric methods with hierarchical splines: error estimator and convergence*, *Math. Models Methods Appl. Sci.* 26 (2016), no. 1, 1–25.
- [12] A. BRESSAN, A. BUFFA, G. SANGALLI *Characterization of analysis-suitable T-splines*, *Comput. Aided Geom. Design* 39 (2015), 17–49.
- [13] P. ANTOLIN, A. BUFFA, F. CALABRÒ, M. MARTINELLI, G. SANGALLI *Efficient matrix computation for tensor-product isogeometric analysis: the use of sum factorization*, *Comput. Methods Appl. Mech. Engrg.* 285 (2015), 817–828.
- [14] A. BUFFA, R. VAZQUEZ, G. SANGALLI, L. BEIRÃO DA VEIGA *Approximation Estimates for Isogeometric Spaces in Multipatch Geometries*, *Numer. Methods Partial Diff. Eq.* 31 - 2 (2015), 422–438
- [15] E. BRIVADIS, A. BUFFA, A., B. WOHLMUTH AND L. WUNDERLICH *Isogeometric mortar methods*, *Comput. Methods Appl. Mech. Engrg.*, 284 (2015), 292–319.
- [16] F. BONIZZONI, A. BUFFA AND F. NOBILE *Moment equations for the mixed formulation of the Hodge Laplacian with stochastic loading term*, *IMA J. Numer. Anal.* 34 (2014), no. 4, 1328–1360.

- [17] R. VÁZQUEZ, A. BUFFA, AND L. DI RIENZO *Isogeometric FEM implementation of high order surface impedance boundary conditions*, IEEE Trans. Magn., 50-6 (2014).
- [18] R.. VÁZQUEZ, A. BUFFA, L. DI RIENZO AND D. LI *Isogeometric Finite Elements With Surface Impedance Boundary Conditions*, IEEE Trans. Magn., 50 -2, (2014) 429–432.
- [19] L. BEIRÃO DA VEIGA, A. BUFFA, G. SANGALLI, R. VÁZQUEZ *Mathematical analysis of variational isogeometric methods*, Acta Numer. 23 (2014), 157–287.
- [20] F. BREZZI, A. BUFFA, G. MANZINI *Mimetic scalar products of discrete differential forms*, J. Comput. Phys. 257 (2014), 1228–1259.
- [21] A. BUFFA, G. SANGALLI, R. VÁZQUEZ *Isogeometric methods for computational electromagnetics: B-spline and T-spline discretizations*, J. Comput. Phys. 257 (2014), 1291–1320.
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