# Curriculum Vitae

## Frédéric Valentin

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### Scientific Interest

My contribution in computational and applied mathematics lies in devising and analyzing innovative numerical methods and mathematical models for multiscale phenomena appearing in engineering and life science problems. My primary tools are partial differential equations, finite element methods, domain decomposition techniques, and numerical and asymptotic analysis. I am also interested in the implementation of numerical algorithms underlying multiscale numerical methods for the new generation of massively parallel architectures.

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### Personal Information

Name: Frédéric Gérard Christian Valentin
Place of birth: Marseille, France
Date of birth: 27/04/1970
Nationality: French and Brazilian
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### Education

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| 1998 | Ph.D. in Applied Mathematics, Université Pierre et Marie Curie - Paris 6, France <br> Adviser: Olivier Pironneau |
| 1994 | M.Sc. in Applied Mathematics, Universidade Federal do Rio de Janeiro - UFRJ, Brazil <br> Adviser: Leopoldo Penna Franca |
| 1992 | B.Sc. in Scientific Computation, Universidade Federal do Rio de Janeiro - UFRJ, Brazil |

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### Work Experience

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| 2018– | INRIA International Chair |

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| 2017– | Membership of the CNPq Mathematics Committee |
| 2015– | Head of the Department of Computational and Mathematical Methods at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil. |
| 2009– | Senior Researcher at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil |
| 2015–2018 | Brazilian Coordinator of the Associate-Team Project with INRIA/France |
| 2015–2017 | LNCC Coordinator of the HPC4E Project within the Brazil-European Community – Horizon 2020 Program |
| 2014–2015 | Visiting Researcher at INRIA Sophia-Antipolis, France |
| 2008–2009 | Coordinator of the PCI (Program for Scientific Financial Support) at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil. |
| 2007–2009 | Head of Department of Computational and Applied Mathematics at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil. |
| 2000–2009 | Researcher at LNCC - National Laboratory for Scientific Computing, Petrópolis, Brazil |
| 2007–2008 | Visiting Researcher at University of Colorado at Denver, Denver, USA |
| 2005–2006 | Postdoctoral at University of Colorado at Denver, Denver, USA |
| 2004–2004 | Postdoctoral at University of Paris 6, Paris, France |
| 1999–2000 | Postdoctoral at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil |
| 1995–1998 | Ph.D. student at Université de Paris 6 and Institut National de Recherche en Informatique et en Automatique - INRIA, Paris, France |

## Plenary and Semi-Plenary Speaker

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| 2019 | Third BR InterPore Conference on Porous Media, Petrópolis, Brazil |
| 2019 | WCMNA 2019 - Workshop on Computational Modeling and Numerical Analysis, Petrópolis, Brazil |
| 2018 | International Conference BAIL - Boundary and Interior Layers, Glasgow, UK |

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| 2017 | *Multiscale Hybrid-Mixed Methods*, International Mathematical Conference of BRICS, Beijing, China |
| 2016 | *Multiscale Hybrid-Mixed Method: An Overview and Recent Developments*, XLII Semana de la Matemática, Valparaíso, Chile |
| 2015 | *Multiscale Hybrid-Mixed Method for Porous Media Problems*, First PANACM, Buenos Aires, Argentina |
| 2014 | *Multiscale Hybrid-Mixed Methods*, London Mathematical Society – EPSRC Durham Symposium, Building bridges: Connections and Challenges in Modern Approaches to Numerical Partial Differential Equations, Durham, UK |
| 2009 | *On a Residual Local Projection Method for the Oseen and Navier-Stokes Equations*, XXX CILAMCE, Búzios, Brazil |

## PUBLICATIONS

*Books and Chapter of Books*

- *Foundations of the MHM Method*, In G. R. Barrenechea, F. Brezzi, A. Cangiani, and E. H. Georgoulis, editors, Building Bridges: Connections and Challenges in Modern Approaches to Numerical Partial Differential Equations, Lecture Notes in Computational Science and Engineering. Springer, 2016, with Harder, C.

- *Shape Control versus Boundary Control*, Equations aux Dérivées Partielles et Applications (eds. Murat F. et al.), Elsevier, France, 1998, with Achdou, Y. and Pironneau, O.

*Articles*

- *The MHM Method for Elasticity on Polytopal Meshes*, Submitted to IMA Journal of Numerical Analysis, with A.T. Gomes and W. Pereira

- *Bridging the Multiscale Hybrid-Mixed and Multiscale Hybrid High-Order Methods*, Submitted to ESAIM: Mathematical Modelling and Numerical Analysis, with T. Chaumont-Frelet, A. Ern and S. Lemaire

- *An Adaptative Multiscale Hybrid-Mixed Method for the Oseen Equations*, Advances in Computational Mathematics, Vol. 47, No. 15, pp. 1-15, 2021, with Araya, R., Cárcamo, C. and Poza, A.

- *New H(div)-Conforming Multiscale Hybrid-Mixed Methods for the Elasticity Problem on Polygonal Meshes*, ESAIM: Mathematical Modelling and Numerical Analysis, Vol. 55, pp. 1005-1037, 2021, with Devloo, P., Farias, P.A., Gomes, S., Pereira, W., Santos, J.

- *The Multiscale Hybrid Mixed Method in General Polygonal Meshes*, Numer. Math., Vol. 145, pp. 197–237, 2020, with Barrenechea, G.R., Jaillet, F., Paredes, D.

- *A Multiscale Hybrid-Mixed Method for the Helmholtz Equation in Heterogeneous Media*, SIAM Journal on Numerical Analysis, Vol. 58, No. 2, pp. 1029-1067, 2020, with Chaumont-Frélet, T.

- *On a Multiscale a Posteriori Error Estimator for the Stokes and Brinkman Equations*, IMA Journal of Numerical Analysis, Vol. 41, pp. 344-380, 2019, with Araya, R. and Rebolledo, R.

- *A Multiscale Hybrid Method for Darcy's problems using Mixed Finite Element Local Solvers*, Computer Methods in Applied Mechanics and Engineering, Vol. 354, pp. 213-244, 2019, with Durán, O., Devloo, P.R.B. and Gomes, M.S.

- *The Multiscale Hybrid-Mixed Method for the Maxwell Equations in Heterogeneous Media*, SIAM Multiscale Methods and Simulation, Vol. 16, No. 4, pp. 1648-1683, 2018, with Lanteri, S., Paredes, D. and Scheid, C.

- *Multiscale Hybrid-Mixed Method for the Stokes and Brinkman Equations – The Method*, Computer Methods in Applied Mechanics and Engineering, Vol. 324, pp. 29-53, 2017, with Araya, R., Harder C., and Poza, A.

- *On the Robustness of Multiscale Hybrid-Mixed Methods*, Mathematics of Computation, Vol. 86, No. 304, pp. 525-548, 2017, with Paredes, D. and Versieux, H.M.

- *A Hybrid-Mixed Method for Elasticity*, ESAIM: Mathematical Modelling and Numerical Analysis, Vol. 50, No. 2, pp. 311-336, 2016, with Harder, C. and Madureira, A.L.

- *A Low-Order Local Projection Method for the Incompressible Navier-Stokes Equations in Two- and Three-Dimensions*, IMA Journal of Numerical Analysis, Vol. 36, No. 1, pp. 267-295, 2016, with Araya, R. and Poza, A.

- *On a Multiscale Hybrid-Mixed Method for Advective-Reactive Dominated Problems with Heterogenous Coefficients*, SIAM Multiscale Methods and Simulation, Vol. 13, No. 2, pp. 491-518, 2015, with Harder, C. and Paredes, D.

- *An Adaptive Residual Local Projection Finite Element Method for the Navier–Stokes Equations*, Advances in Computation Mathematics, Vol. 40, pp. 1093–1119, 2014, with Araya, R. and Poza, A.

- *Multiscale Hybrid-Mixed Methods*, SIAM Journal on Numerical Analysis, Vol. 51, No. 6, pp. 3505–3531, 2013, with Araya, R., Harder, C. and Paredes, D.

- *A Family of Multiscale Hybrid-Mixed Finite Element Methods for the Darcy Equation with Rough Coefficients*, Journal of Computational Physics, Vol. 245, pp. 107–130, 2013, with Harder, C. and Paredes, D.

- *Numerical Multiscale Methods*, International Journal for Numerical Methods in Fluids, Vol. 70, No. 4, pp. 403–419, 2012, with Coutinho, A.L.G.A. and Franca, L.P.

- *Convergence Analysis of a Residual Local Projection Finite Element Method for the Navier-Stokes Equations*, SIAM Journal on Numerical Analysis, Vol. 50, No. 2, pp. 669–699, 2012, with Araya, R., Barrenechea, G.R. and Poza, A.

- *On a Hierarchical Error Estimator Combined with a Stabilized Method for the Navier-Stokes Equations*, Numerical Methods for PDE, Vol. 28, No. 3, pp. 782–806, 2012, with Araya, R. and Poza, A.

- *Numerical Multiscale Methods for a Dominated Reaction Model*, Computer Methods in Applied Mechanics and Engineering, Vol. 201, pp. 204–228, 2012, with Fernando, H., Harder, C. and Paredes, D.

- *Simulating Transient Phenomena via Residual Free Bubbles*, Computer Methods in Applied Mechanics and Engineering, Vol. 200, No. 25-28, pp. 2127-2130, 2011, with Coutinho, A.L.G.A. and Franca, L.P.

- *Beyond Pressure Stabilization: A Low Order Local Projection Method for the Oseen Equation*, International Journal for Numerical Methods in Engineering, Vol. 86, No. 7, pp. 801-815, 2011, with Barrenechea, G.R.

- *Consistent Local Projection Stabilized Finite Element Methods*, SIAM Journal on Numerical Analysis, Vol. 48, No. 5, pp. 1801-1825, 2010, with Barrenechea, G.R.

- *A Residual Local Projection Method for the Oseen Equation*, Computer Methods in Applied Mechanics and Engineering, Vol. 199, No. 29-32, pp. 1906-1921, 2010 with Barrenechea, G.R.

- *A Symmetric Nodal Conservative Finite Element Method for the Darcy Equation*, SIAM Journal on Numerical Analysis, Vol. 47, No. 5, pp. 3652-3677, 2009, with Franca, L.P. and Barrenechea, G.R.

- *On a Residual Local Projection Method for the Darcy Equation*, C. R. Acad. Sci. Paris, Ser. I 347, pp. 1105–1110, 2009, with Franca, L.P. and Harder, C.

- *Stabilization Arising from PGEM: a Review and Further Developments*, Applied Numerical Mathematics, Vol. 227, No. 1, pp. 93-101, 2009, with Araya, R., Franca, L.P. and Barrenechea, G.R.

- *Weighted Quadrature Rules for Finite Element Methods*, Journal of Computational and Applied Mathematics, Vol. 227, No. 1, pp. 93–101, 2008, with Oliveira, S.P. and Madureira, A.L.

- *A Petrov-Galerkin Enriched Method: A Mass Conservative Finite Element Method for the Darcy Equation*, Computer Methods in Applied Mechanics and Engineering, Vol. 196, No. 21-24, pp. 2449-2464, 2007, with Franca, L.P. and Barrenechea, G.R.

- *Asymptotic of the Poisson Problem in Domains with Curved Rough Boundaries*, SIAM Journal on Mathematical Analysis, Vol. 38, No. 5, pp. 1450–1473, 2007, with Madureira, A.L.

- *A Stabilized Finite Element Method for the Stokes Problem Including Element and Edge Residuals*, IMA Journal of Numerical Analysis, Vol. 27, pp. 172–197, 2007, with Araya, R. and Barrenechea, G.R.

- *Enriched finite element methods for unsteady reaction-diffusion problems*, Communications in Numerical Methods in Engineering, Vol. 22, No. 6, pp. 619-625, 2006, with Franca, L.P. and Ramalho, J.

- *Stabilized Finite Element Methods Based on Multiscale Enrichment for the Stokes Problem*, SIAM Journal on Numerical Analysis, Vol. 44, No. 1, pp. 322-348, 2006, with Araya, R., Barrenechea, R.G.

- *Relationship Between Multiscale Enrichment and Stabilized Finite Element Methods for the Generalized Stokes Problem*, Ser. I, Vol. 341, No. 10, pp. 635-640, 2005, C. R. Acad. Sci. Paris, with Barrenechea, R.G.

- *Multiscale and Residual-Free Bubble Functions for Reaction-Advection-Diffusion Problems*, International Journal for Multiscale Computational Engineering, Vol. 3, No. 3, pp. 297-312, 2005, with Franca, L.P. and Ramalho, J.

- *Convergence Analysis of a Multiscale Finite Element Method for Singularly Perturbed Problems*, SIAM Multiscale Methods and Simulation, Vol. 4, No. 3, pp. 839-866, 2005, with Franca, L. P., Madureira, A. L. and Tobiska, L.

- *Towards Multiscale Functions: Enriching Finite Element Spaces with Local but not Bubble-Like Functions*, Computer Methods in Applied Mechanics and Engineering, Vol. 194, No. 27-29, pp. 3006-3021, 2005, with Franca, L.P. and Madureira, A.L.

- *A Multiscale A Posteriori Error Estimate*, Computer Methods in Applied Mechanics and Engineering, Vol. 194, No. 18-20, pp. 2077-2094, 2005, with Araya, R.

- *An Unusual Stabilized Finite Element Method for a Generalized Stokes Problem*, Numeriche Mathematik, No. 92, pp. 653-677, 2002, with Barrenechea, R.G.

- *New Wall Laws for the Unsteady Incompressible Navier-Stokes Equations*, ESAIM: Mathematical Modelling and Numerical Analysis, Vol. 36, No. 2, pp. 177-203, 2002, with Barrenechea, R.G. and LeTallec, P.

- *Analysis of Curvature Influence on Effective Boundary Conditions*, C. R. Acad. Sci. Paris, Ser. I 335, pp. 499-504, 2002, with Madureira, A.L.

- *On an Improved Unusual Stabilized Finite Element Method for the Advective-Reactive-Diffusive Equation*, Computer Methods in Applied Mechanics and Engineering, Vol. 190, No. 13-14, pp. 1785-1800, 2000, with Franca, L.P.

- *Effective Boundary Condition for Laminar Flows over Rough Boundaries*, Journal of Computational Physics, Vol. 147, No. 1, pp. 187-218, 1998, with Achdou, Y. and Pironneau, O.

- *Constructing Wall Laws with Domain Decomposition or Asymptotic Expansion Techniques*, Computer Methods in Applied Mechanics and Engineering, No.151, pp. 215-232, 1998, with Achdou, Y., LeTallec, P. and Pironneau, O.

- *Rough Boundaries and Wall Laws*, International Journal of Numerical Methods in Fluids, Vol. 27 No. 1-4, pp. 169-177, 1998, with Mohammadi, B. and Pironneau, O.

- *Domain Decomposition and Wall Laws*, Surikaisekikenkyusho, No. 989, pp. 42-55, 1997, with Achdou, Y., Mohammadi, B. and Pironneau, O.

- *Combining Stabilized Finite Element Method*, Computational and Applied Mathematics, Vol. 14, No. 3, pp. 285-300, 1995, with Franca, L. P.

*Proceedings in Symposia and Conferences*

- *The MHM-Method on Non-Conforming Polygonal Meshes*, WCMNA - Workshop on Computational Modeling and Numerical Analysis, Petrópolis, Brazil, 2019, with Barrenechea, G.R., Jaillet, F. and Paredes, D.

- Multiscale Hybrid-Mixed Methods for Fluids, Bail 2018 - International Conference on Boundary and Interior Layers, 2018, Glasgow, UK.

- *The Multiscale Hybrid-Mixed Finite Element Method in Polygonal Meshes*, 13th International Workshop on Variational Multiscale and Stabilized Finite Elements (VMS), Berlin, Germany, 2018, with Barrenechea, G.R., Jaillet, F. and Paredes, D.

- *Multiscale Hybrid-Mixed Methods for the Stokes and Brinkman Equations*, ECCM ECFD 2018, Glasgow, UK, 2018, with Araya, R., Harder, C. and Poza, A.H.

- *A Multiscale Hybrid-Mixed Method for the Elastodynamic Model with Rough Coefficients*, CILAMCE2017 - XXXVIII Ibero-Latin American Congress on Computational Methods in Engineering, Florianópolis, Brazil, 2017, with Gomes, A.T., Paredes, D., Pereira, W. and Souto, R.

- *Performance Analysis of the MHM Simulator in a Petascale Machine*, To appear in CILAMCE2017 - XXXVIII Ibero-Latin American Congress on Computational Methods in Engineering, Florianópolis, Brazil, 2017, with Gomes, A.T., Paredes, D., Pereira, W. and Souto, R.

- *Multiscale Hybrid-Mixed Method for Fluids*, Mathematical Congress of the Americas - MCA 2017, 2017, Montreal, Canada, with Araya, R., Harder, C. and Poza, A.

- *The Multiscale Hybrid Mixed Method for Time Dependent Propagation of Electromagnetic Waves*, ENUMATH 2017, 2017, Voss, Norway, with Lanteri, S., Paredes,D. and Scheid, C.

- *A Multiscale Hybrid-Mixed Method for the Maxwell Equations in Time Domain*, ICOSAHOM 2016, 2016, Rio de Janeiro, Brazil, with Lanteri, S., Leger, R., Paredes,D. and Scheid, C.

- *A MHM Method for the Helmholtz Equation*, ICOSAHOM 2016, 2016, Rio de Janeiro, Brazil, with Chaumond, T.

- *A Multiscale Hybrid-Mixed Method for the Stokes and Brinkman Equations*, MAFELAP 2016, pg. 1, 2016, Brunel, UK, with Araya, R., Harder, C. and Poza, A.

- *MHM Methods for Time Dependent Propagation of Electromagnetic Waves*, First PANACM, 2015, Buenos Aires, Argentina, with Lanteri, S., Paredes, D. and Scheid, C.

- *Multiscale Hybrid-Mixed Method for Porous Media Problems*, First PANACM, 2015, Buenos Aires, Argentina, with Harder, C. and Paredes, D.

- *Multiscale Hybrid-Mixed Methods*, First PANACM, 2015, Buenos Aires, Argentina

- *The Construction of Multiscale Hybrid - Mixed (MHM) Finite Elements Spaces Using the Object Oriented Computation Library NeoPZ*, First PANACM, 2015, Buenos Aires, Argentina, with Devloo, P., Farias, A.,Gomes, S.M. and Paredes, D.

- *Multiscale Hybrid-Mixed Methods*, London Mathematical Society – EPSRC Durham Symposium, Building bridges: Connections and Challenges in Modern Approaches to Numerical Partial Differential Equations, 2014, Durham, UK

- *MHM Method for Advective-Reactive Dominated Models*, MAFELAP 2013, pg. 273, 2013, Brunel, UK, with Harder, C. and Paredes, D.

- *A Multiscale Hybrid-Mixed Finite Element Method for Advection-Diffusion Problems*, IV WONAPDE, Vol. 1, pg. 111, 2013, Concepcion, Chile, with Harder, C. and Paredes, D.

- *Multiscale Hybrid-Mixed Finite Element*, IV WONAPDE, Vol. 1, pg. 192, 2013, Concepcion, Chile, with Araya, R., Harder, C. and Paredes, D.

- *Multiscale Hybrid-Mixed Finite Element and Numerical Zoom*, Advances in Computational Mechanics (ACM 2013) - A Conference Celebrating the 70th Birthday of Thomas J.R. Hughes, 2013, San Diego, USA, with Araya, R., Harder, C. and Paredes, D.

- *A Family of Multiscale Finite Element Methods for the Darcy Equation*, 10th WCCM, Vol.1, pg. 91 2012, São Paulo, Brazil, with Harder, C. and Paredes, D.

- *A Family of Stabilized Multiscale Finite Element Methods for the Darcy Equation*, 10th WCCM, Vol. 1, pg. 193, 2012, São Paulo, Brazil, with Harder, C. and Paredes, D.

- *A Multiscale Hybrid-Mixed Finite Element Method for Advection-Dominated Problems*, 10th WCCM, Vol. 1, pg 220-221, 2012, São Paulo, Brazil, with Harder, C. and Paredes, D.

- *A Multiscale Space-Time Formulation of the Petrov-Galerkin Method for the Heterogeneous Cable Equation*, 10th WCCM, Vol. 1, pg. 347, 2012, São Paulo, Brazil, with Fernando, H. and Madureira, A.L.

- *SPiNMe: An Environment for the Rapid Prototyping of New Numerical Methods*, 10th WCCM, Vol. 1. pg. 12-13, 2012, São Paulo, Brazil, with Paredes, D., Gomes, A.T.A. and Teixeira, F.

- *On Multiscale Hybrid-Mixed Methods*, Variational Multiscale Methods - VMS, 2012, Kiel, Germany, with Harder, C. and Paredes, D.

- *A Family of Stable and Stabilized Finite Element Methods for the Darcy Model with Rough Coefficients*, Variational Multiscale Methods - VMS, 2011, Glasgow, Scotland, with Harder, C. and Paredes, D.

- *Edge-Based Finite Element Methods for the Darcy Problem with Rough Coefficients*, XXXII CILAMCE, Ouro Preto, Brazil, 13-16 November, 2011, with Harder, C. and Paredes, D.

- *Supporting the Perpetuation and Reproducibility of Numerical Method Publications*, Procedia Computer Science, Vol. 4, pp. 688–696, 2011, with Gomes, A.T.A. and Paredes, D.

- *Tratamento de Inferência em Bancos de Dados Ecológicos*, Congresso da Sociedade Brasileira de Computação, Natal. Anais do XXXI CSBC - V eScience, 2011, with Poltosi, M., Palazzi, D., Moura, A.M.C., Porto, F and Valentin, J.L.

- *On a Residual Local Projection Method for the Incompressible Navier-Stokes Equations*, XXXI CILAMCE, Vol XXIX, p.p 4563-4572, Buenos Aires, Argentina, 2010, with Araya, R., Barrenechea, G.R. and Poza, A.

- *Residual, and Non-Residual, Low Order Local Projection Stabilized Finite Element Methods*, III WONAPDE, pg. 149, Concepcion, Chile, 2010, with Barrenechea

- *Numerical Analysis of a Residual Local Projection Method for the Darcy Equation*, III WONAPDE, pg. 157, Concepcion, Chile, 2010, with Barrenechea, G.R., Franca, L.P. and Harder, C.

- *On a Residual Local Projection Method for the Oseen and Navier-Stokes Equations*, XXX CILAMCE, Búzios, Brazil, 2009, with Araya, R., Barrenechea, G.R. and Poza, A.

- *Nodal symmetric locally mass conservative finite element methods for Darcy flow*, MAFELAP 2009, Brunel, UK, 2009, with Barrenechea, G.R. and Franca, L.P.

- *Numerical Analysis of a Residual Local Projection Method for the Darcy Equation*, III CLAM, Santiago, Chile, 2009, with Barrenechea, G.R., Franca, L.P. and Harder, C.

- *On a Posteriori Error Analysis for the Navier-Stokes Equation*, 3nd LNCC meeting on Computational Modeling, LNCC, Petrópolis, Brazil, 2008, with Araya, R and Poza, A.

- *Transient Multiscale Functions for Parabolic Problems*, 2nd LNCC meeting on Computational Modeling, LNCC, Petrópolis, Brazil, 2006, with Ramalho, J.

- *Petrov-Galerkin Enriched Methods*, Fukuoka, Japan, 2007, with Barrenechea, G.R. and Franca, L.P.

- *A Mass Conservative Petrov-Galerkin Enriched Method for the Darcy Equation*, 2nd LNCC meeting on Computational Modeling, LNCC, Petrópolis, Brazil, 2006, with Franca, L.P. and Barrenechea, G.R.

- *A Petrov-Galerkin Enriched Method (PGEM) for isotropic infinitesimal elasticity based upon a four-field variational principle*, 7th World Congress on Computational Mechanics, Los Angeles, USA, 18-23 July, 2006, with Franca, L.P. and Harder, C.

- A Petrov-Galerkin Enriched Method (PGEM) for the Darcy Equation, MAFELAP 2006, Brunel, England, 13-15 June, 2006, with Franca, L.P.

- *Multiscale and Stabilized Finite Element Methods for the Generalized Stokes Problem*, MAFELAP 2006, Brunel, England, 13-15 June, 2006, with Barrenechea, G.R.

- *Petrov-Galerkin Enriched Methods (PGEM)*, 7th World Congress on Computational Mechanics, Los Angeles, USA, 18-23 July, 2006, with Franca, L.P.

- *Stabilizing the $P^1/P^0$ element for the Stokes Problem via Multiscale Enrichment*, Multiscale Methods in Computational Fluid Dynamics: Stabilized Methods fo NSE, pp. 783-790, ENUMATH 2005, Santiago de Compostela, Spain, 18-22 July, 2006, with Araya, R. and Barrenechea, G.R.

- *A Douglas Wang type stabilized finite element method for the Stokes problem*, MECOM 2005, Buenos Aires, Argentina, 2005, with Araya, R. and Barrenechea, G.R.

- *Multiscale Finite Elements in Fluids*, Eighth U.S. National Congress on Computational Mechanics - USNCCM8, Austin, USA, 2005, with Franca, L.P. and Ramalho, J.

- *A Multiscale Finite Element Method*, ECCOMAS 2004, Jyväskylä, Finland, 2004, with Franca, L.P., Madureira, A.L.

- *Multiscale Finite Element Methods for Linear Unsteady Reaction–Diffusion Problems*, XXV CILAMCE, Recife, Brazil, 2004, with Franca, L.P. and Ramalho, J.

- *A Stabilized Finite Element Method for Incompressible Flow Problems with Dominating Reaction*, XI MAFELAP Conference, Brunel University, UK, 2004, with Gabriel R. Barrenechea, M.A. Fernández

- *A New Multiscale Finite Element Method*, ENUMATH 2003, Prague, Tchec Republic, 2003, with Franca, L.P., Madureira, A.L. and Ramalho, J.

- *An a Posteriori Error Estimate for a Singularly Perturbed Problem*, ENU-MATH 2003, Prague, Tchec Republic, 2003, with Araya R.

- *Modeling Multiscale Phenomena via Finite Element Methods*, WCCM V, Vienna, Austria, July 8-12, 2002, with Franca, L.P., Madureira A. L.

- *Analysis of Curvature Influence on Effective Boundary Conditions*, ENU-MATH 2001, Ischia, Italy, July 23-28, 2001, with Madureira, A. L.

- *A Stabilized Finite Element Method for a Generalized Stokes Problem*,ă 6th US National Congress on Computational Mechanics, Dearborn, Michigan, USA, August 1-4, 2001, with Barrenechea, R. G. and LeTallec, P.

- *Comparison of Wall Laws for Unsteady Incompressible Navier-Stokes Equations*, First MIT Conference on Computational Fluid and Solid Mechanics,ă Boston, USA, June 12-15, 2001, with Achdou, Y. and Pironneau, O.

- *New Wall Laws for Unsteady Incompressible Navier-Stokes Equations*, EC-COMAS 2000, Barcelona, Spain, 2000, with Achdou, Y. and Pironneau, O.

- *A Stabilized Finite Element Method for Incompressible Navier-Stokes Equations Satisfying Wall Laws*, XX CILAMCE, Sao Paulo, Brazil, 1999, with Achdou, Y. and Pironneau, O.

- *On an Improved Unusual Stabilized Finite Element Method for the Advective-Reactive-Diffusive Equation*, Fifth U.S. National Congress on Computational Mechanics, University of Colorado at Boulder, USA, August 4-6, 1999, with Franca, L.P.

- *Ocean-Atmosphere Boundary Conditions Matching over Wavy Surfaces by Domain Decomposition and Asymptotic Analysis*, ENUMATH99, Jyvashyla, Finland, July, 1999, with Achdou, Y. and Pironneau, O.

- *Nouvelle Loi de Paroi pour les Équations de Navier-Stokes : Application aux Écoulements à Haut Reynolds*, 30 ème Congrés National d'Analyse Numérique - CANum'98, Arles, France, 1998, with Achdou, Y. and Pironneau, O.

- *The Wall Laws for Rough Domains by Asymptotic Analysis*, Fourth World Congress on Computational Mechanics, Buenos Aires, Argentina, 1998, with Achdou, Y. and Pironneau, O.

- *Constructing Wall Laws with Domain Decomposition or Asymptotic Expansion Techniques*, Workshop held on ocasion of the J. T. Oden's sixtieth birthday, Austin, USA, 1997, with Achdou Y., LeTallec, P. and Pironneau, O.

- *Construction des Lois de Parois par Développement Asymptotique*, 29 ème Congrés National d'Analyse Numérique - CANum'97, Larnas, France, 1997, Achdou, Y., LeTallec, P. and Pironneau, O.

- *Interfaces Rugueuses et Lois de Paroi : Application aux Écoulements Compressibles Turbulents*, 28 ème Congrés National d'Analyse Numérique - CANum'96, La Londe-Les Maures, France, 1996, with Mohammadi, B., LeTallec, P. and Pironneau, O.

- *Domain Decomposition and Wall Laws*, Domain Decomposition Methods and Related Problems, Kyoto, Japan, 1995, with Achdou, Y., Mohammadi, B. and Pironneau, O.

- *Rough Boundaries and Wall Laws*, Ninth International Conference in Finite Elements for Fluids, Venice, Italy, 1995, with Mohammadi, B. and Pironneau, O.

- *Wall Laws for Rough Interfaces*, CRM - Workshop on Euler and Navier-Stokes Equations, Montreal, Canada, 1995, with Mohammadi, B. and Pironneau, O.

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## Awards

- Research Award, FAPERJ, Brazil, 2021

- INRIA International Chair, 2018

- Young Research Award, FAPERJ, Brazil, 2007

- Young Research Award, FAPERJ, Brazil, 2003

- Young Research Award, FAPERJ, Brazil, 2002

- Young Research Award in the First MIT Conference on Computational Fluid and Solid Mechanics M.I.T., USA, 2001

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## Grants

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| 01/2021-01/2022 | Grant by CAPES/Brazil, MATH/AMSUD, EOLIS Project, to develop researched related to efficient off-LIne numerical strategies for multi-query for partial differential equations |
| 01/2018-01/2020 | Grant by CAPES/Brazil, MATH/AMSUD, PHOTOM Project, to develop researched related to innovative multiscale and hybrid numerical methods for solar energy models |
| 01/2016-01/2018 | Grant by RNP/Brazil, Brazil-European Community - H2020 Program, HPC4E Project, to develop researched related to innovative numerical methods for massive parallel computers with application in energy |
| 10/2015-10/2018 | Grant by FAPERJ/Brazil, Associate-Team Project with INRIA, to develop researched related to multiscale mixed-hibrid finite element methods for highly heterogenous wave propagation problems |

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| 10/2013-10/2016 | Grant by CNPq/Brazil, to develop researched related to multiscale mixed-hibrid finite element methods for fluid flows in porous media |
| 01/2013-01/2015 | Grant by CAPES/Brazil, to develop researched related to multiscale mixed-hibrid finite element methods at INRIA/France |
| 01/2012-01/2014 | Grant by CNPq/Brazil, to develop researched related to multiscale mixed-hibrid finite element methods |
| 01/2010-01/2012 | Grant by CNPq/Brazil, to develop researched related to the relationship between enriched and discontinuous finite element methods |
| 07/2010-01/2012 | Grant by CNPq/Brazil, a posdoctoral scholarship to develop researches related to multiscale finite element methods for porous media problems with rough coefficients |
| 03/2009-03/2010 | Grant by CONICYT/Chile, to develop researches related to a posteriori error estimators |
| 03/2009–03/2013 | Grant by CNPq/Brazil, a Ph.D. scholarship to develop researches related to relationship between multiscale and discontinuous finite element methods |
| 03/2008–03/2010 | Grant by Stic-AMSUD/CAPES - Brazil, to develop researches related to numerical modeling for medical brain problems |
| 08/2006–06/2009 | Grant by NSF/USA, to develop researches related to enriched finite element methods for porous media models |
| 03/2006–03/2008 | Grant by CNPq/CONICYT - Brazil/Chile, to develop researches related to enriched finite element methods |
| 07/2005–06/2006 | Visiting scholar grant by CAPES, Brazil, to develop researches related to multiscale finite element methods |
| 01/2003–03/2005 | Grant by CNPq/CONICYT - Brazil/Chile, to develop researches related to multiscale a posteriori error estimate |
| 09/2004–12/2004 | Grant by CNRS/France, to develop researches related to effective boundary conditions in fluid dynamics |
| 03/2002–03/2003 | Grant by FAPERJ, Brazil, to develop researches related to multiscale finite element methods applied to Guanabara Bay |
| 11/2001–11/2003 | Grant by CNPq, Brazil, to develop researches related to effective boundary conditions |
| 03/2001–03/2002 | Grant by FAPERJ, Brazil, to develop researches related to finite element method applied to Guanabara Bay |
| 12/2001 | Grant by Universidad de Concepción, Chile, to visit the Universidad de Concepción |

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| 07/2001–08/2001 | Grant by LNCC /MCT, Brazil and Université de Paris 6, France, to attend l'École d'Été du CEMRACS, Marseille, France |
| 09/2000–10/2000 | Grant by CNPq, Brazil, and Institut Nacional de Recherche en Informatique et en Automatique - INRIA, France, to visit the Institut Nacional de Recherche en Informatique et en Automatique, Paris, France |
| 1999–2000 | Grant by CNPq, Brazil, Postdoctoral at LNCC, Brazil |
| 08/1999 | Grant by CNPq, Brazil, to visit the University of Colorado at Boulder |
| 08/1998–12/1998 | Grant by Institut Nacional de Recherche en Informatique et en Automatique - INRIA, France, to visit the University of Colorado at Boulder |

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## Short Term Visiting Position

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| 06/2019-07/2019 | Visiting researcher at INRIA Sophia-Antipolis, France. |
| 01/2019-02/2019 | Visiting researcher at INRIA Sophia-Antipolis, France. |
| 12/2017-02/2018 | Visiting researcher at INRIA Sophia-Antipolis, France. |
| 10/2016 | Visiting researcher at University of Concepcion and Universidad Católica de Vaparaiso, Chile. |
| 01/2013 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 01/2012 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 01/2011 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 01/2010 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 01/2009 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 12/2008 | Visiting researcher at University of Grenoble, Grenoble, France. |
| 06/2007–07/2008 | Visiting researcher at University of Colorado at Denver, Denver, USA. |
| 07/2006–08/2007 | Visiting researcher at University of Colorado at Denver, Denver, USA. |
| 01/2008 | Visiting researcher at University of Concepcion, Concepcion, Chile. |

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| 01/2007 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 09/2004–12/2004 | Visiting researcher at Université de Paris 6, Paris, France. |
| 01/2004 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 07/2003 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 12/2001 | Visiting researcher at University of Concepcion, Concepcion, Chile. |
| 07/2001 | Visiting researcher at École d'Été du CEMRACS, Université de Luminy, Marseille, France |
| 07/2000 | Visiting researcher at Institut National de Recherche en Informatique et en Automatique, Paris, France |
| 07/1999 | Visiting professor at University of Colorado at Denver, Colorado, USA |
| 08/1998–12/1998 | Visiting professor at University of Colorado at Denver, Colorado, USA |

## Teaching Experience

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|---|---|
| 03/2021–06/2021 | Ph.D. course in Finite Element Method |
| 01/2021 | Course of Finite Element Method at FGV |
| 08/2016–11/2016 | Ph.D. course in Finite Element Method |
| 03/2015–06/2015 | Ph.D. course in Finite Element Method |
| 09/2011–12/2011 | Ph.D. course in Finite Element Method |
| 09/2010–12/2010 | Ph.D. course in Finite Element Method |
| 03/2004–06/2004 | Ph.D. course in Ordinary Differential Equations |
| 02/2004 | Summer LNCC course in Finite Element Method |
| 03/2003–06/2003 | Ph.D. course in Ordinary Differential Equations |
| 03/2002–06/2002 | Ph.D. course in Ordinary Differential Equations |
| 03/2002–06/2002 | Ph.D. course in Finite Element Method (joint with Leopoldo Franca) |

## Graduate Students

- Ph.D. Thesis, Larissa Martins, *New Multiscale Finite Element Method for Fluids*, LNCC - Brazil, Adviser, 01/2020-

- Master Thesis, Larissa Martins, *A Petrov-Galerkin Multiscale Hybrid-Mixed Method for the Darcy Equation on Polytope*, LNCC - Brazil, Adviser, 09/2017-09/2019

- Ph.D. Thesis, Weslley da Silva Pereira, *Multiscale Hybrid-Mixed Methods for Heterogeneous Elastic Models*, LNCC - Brazil, Adviser, 03/2015-09/2019

- Ph.D. Thesis, Ramiro Rebolledo, *A Posteriori Error Estimator for Multiscale Finite Element Methods*, Universidad de Concepción, Chile, Co-Adviser, 07/2014-

- Ph.D. Thesis, Diego Paredes, *New Multiscale Finite Element Methods: Theory and Applications*, LNCC - Brazil, Adviser, 03/2009-07/2013

- Ph.D. Thesis, Abner Poza, *Método de Elementos Finitos Adaptativos y Multiescalas Aplicados a Problemas de Mecânica de Fluidos*, Universidad de Concepción, Chile, Co-Adviser, 07/2008-11/2011

- Ph.D. Thesis, Honório Fernando, *Numerical Analysis of New Stabilized and Enriched Finite Element Methods Applied to Elliptic and Parabolic Reaction-Diffusion Models*, LNCC - Brazil, 07/2004-07/2010

- Ph.D. Thesis, Christopher Harder, *Residual Local Projection Methods for the Darcy Equation*, University of Colorado at Denver - USA, Co-Adviser, 08/2005-01/2010

- Ph.D. Thesis, Jairo Ramalho, *New Enriched Finite Element Methods for Unsteady Reaction-Advection-Diffusion Problems.*, LNCC - Brazil, 03/2001-12/2005

Petrópolis, Brazil, June 10, 2021