CURRICULUM VITAE

FRÉDÉRIC VALENTIN

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 and their interplay with artificial intelligence techniques.

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

1998	Ph.D. in Applied Mathematics, Sorbonne Université - Campus Pierre et Marie Curie - Paris 6, France. Title: *Nouvelles Conditions aux Limites Équivalentes pour des Interfaces Rugueuses en Mécanique des Fluides : Développement, Analyse et Mise en Oeuvre Numérique.* Advisor: Olivier Pironneau
1994	M.Sc. in Applied Mathematics, Universidade Federal do Rio de Janeiro - UFRJ, Brazil. Title: *Método Estabilizado Combinado para um Modelo de Turbulência.* Advisor: Leopoldo Franca.
1992	B.Sc. in Scientific Computation, Universidade Federal do Rio de Janeiro - UFRJ, Brazil

Work Experience

2009–	Senior Researcher at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil
2023–	Brazilian Scientific Director of the Inria-Brasil International Associate Laboratory (https://project.inria.fr/inriabrasil/)
2020–2023	Brazilian Coordinator of Math/Amsud Project with INRIA/France and University of Concèpcion/Chile, and LNCC/Brazil
2018–2023	INRIA International Chair
2022–2022	Visiting Professor at Université Côte d'Azur/France
2015–2021	Head of the Department of Computational and Mathematical Methods at LNCC – National Laboratory for Scientific Computing, Petrópolis, Brazil.
2017–2020	Membership of the CNPq Mathematics Committee (CA-MA)
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

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
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

1. *Multiscale Hybrid-Mixed Methods for the Stokes and Brinkman Equations - A Priori Analysis*, SIAM Journal on Numerical Analysis, Vol. 63, No. 2, pp. 588–618, 2025, with Araya, R., Harder, C., and Poza, A.H.

2. *Generalizing the Multiscale Hybrid-Mixed Method for Reactive-Advective-Diffusive Equations.*, Computer Methods in Applied Mechanics and Engineering, Vol. 428, pp. 117089, 2024, with Araya, R., Jaillet, F. and Paredes, D.

3. *Revisiting the Robustness of the Multiscale Hybrid-Mixed Method: The Face-Based Strategy*, Journal of Computational and Applied Mathematics, Vol. 436, pp. 115415, 2024, with Paredes, P. and Versieux, H.

4. *A Petrov-Galerkin Multiscale Hybrid-Mixed Method for the Darcy Equation on Polytopes*, Computational and Applied Mathematics, Vol. 42, 2023, with H. Fernando, H., Martins, L. and Pereira, W.

5. *The MHM Method for Linear Elasticity on Polytopal Meshes*, IMA Journal of Numerical Analysis, Vol. 43, No. 3, pp. 2265–2298, 2023, with Gomes, A.T. and Pereira, W.

6. *Bridging the Multiscale Hybrid-Mixed and Multiscale Hybrid High-Order Methods*, ESAIM: M2AN, Vol. 56, No. 1, pp. 261-285, 2022, with T. Chaumont-Frelet, T. and Ern, A. and Lemaire, S.

7. *An Adaptive 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.

8. *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.

9. *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.

10. *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.

11. *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.

12. *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.

13. *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.

14. *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.

15. *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.

16. *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.

17. *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.

18. *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.

19. *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.

20. *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.

21. *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.

22. *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.

23. *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.

24. *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.

25. *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.

26. *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.

27. *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.

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

29. *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.

30. *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.

31. *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.

32. *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.

33. *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.

34. *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.

35. *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.

36. *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.

37. *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.

38. *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.

39. *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.

40. *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.

41. *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.

42. *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.

43. *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.

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

45. *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.

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

47. *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.

48. *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.

49. *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.

50. *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.

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

52. *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

1. *$H(div, \Omega)$-Optimality and Fully Computable a Posteriori Estimator for Multiscale Hybrid Mixed Methods*, CNMAC 2024, Porto de Galinhas, 16th-20th of September 2024, with Martins, L. and Pereira, W.

2. *Interplay of Physics-Informed Neural Networks and Multiscale Numerical Methods*, CNMAC 2024, Porto de Galinhas, 16th-20th of September 2024, with Gomes, A.T.A and Miguez, L.

3. *Multiscale Numerical Methods and their Interplay with Artificial Intelligence*, ECCOMAS 2024, Lisbon, Portugal, on 3rd-7th of July, 2024, with Fonseca, J., Gomes, A.T.A. and Miguez, L.

4. *The MH^{2}M Method*, ECCOMAS 2022, Oslo, Norway, on 5th-9th of June, 2022, with De Barros, F. and Madureira, A.L.

5. *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.

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

7. *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.

8. *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.

9. *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.

10. *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.

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

12. *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.

13. *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.

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

15. *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.

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

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

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

19. *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.

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

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

22. *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.

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

24. *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.

25. *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.

26. *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.

27. *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.

28. *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.

29. *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.

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

31. *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.

32. *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.

33. *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.

34. *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.

35. *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.

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

37. *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.

38. *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.

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

40. *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.

41. *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.

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

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

44. *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.

45. *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.

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

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

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

49. *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.

50. *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.

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

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

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

54. *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

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

56. *An a Posteriori Error Estimate for a Singularly Perturbed Problem*, ENUMATH 2003, Prague, Tchec Republic, 2003, with Araya R.

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

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

59. *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.

60. *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.

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

62. *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.

63. *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.

64. *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.

65. *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.

66. *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.

67. *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.

68. *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.

69. *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.

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

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

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

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

Grants

09/2022-09/2025   Grant by CNPq/Brazil (Special Program for International Cooperation), to study the development and numerical analysis of multiscale finite element methods: Connections with artificial intelligence techniques and applications

01/2021-12/2023   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

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
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

Short Term Visiting Position

10/2022-01/2023	Visiting professor at Université Côte d'Azur/France.
07/2021-02/2023	Visiting researcher at INRIA Sophia-Antipolis, France.
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.
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

02/2024–02/2024	Course of Physics Informed Neural Network: Theory and Practice at LNCC Summer School
01/2023–02/2023	Ph.D. course in Multiscale Finite Element Method at Université Côte d'Azur
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

- Master Thesis, Juan Pacazuca, *The Interplay between Multiscale Methods and Operator Learning*, LNCC - Brazil, Adviser, 03/2024-

- 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, April 25, 2025