

# CURRICULUM VITAE

FRÉDÉRIC VALENTIN

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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  
Address: Av. Getúlio Vargas, 333  
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## EDUCATION

- 03/1995 – 12/1998 Ph.D. in Applied Mathematics, Université Pierre et Marie Curie - Paris 6, France  
Adviser: Olivier Pironneau
- 03/1993 – 07/1994 M.Sc. in Applied Mathematics, Universidade Federal do Rio de Janeiro - UFRJ, Brazil  
Adviser: Leopoldo Penna Franca
- 03/1988 – 12/1992 B.Sc. in Scientific Computation, Universidade Federal do Rio de Janeiro - UFRJ, Brazil

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## WORK EXPERIENCE

- 2008–2009 Coordinator of the PCI (Program for Scientific Financial Support) at Laboratório Nacional de Computação Científica - LNCC, Petrópolis, Brazil.
- 2007–2009 Head of the Applied Mathematics Department at Laboratório Nacional de Computação Científica - LNCC, Petrópolis, Brazil.
- 2005–2006 Postdoctoral at University of Colorado at Denver, Denver, USA.
- 2004–2004 Postdoctoral at University of Paris 6, Paris, France.

2000–	Researcher at Laboratório Nacional de Computação Científica - LNCC, Petrópolis, Brazil
1999–2000	Postdoctoral at Laboratório Nacional de Computação Científica - LNCC, 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

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## PUBLICATIONS

### *Articles*

- *Beyond Pressure Stabilization: A Low Order Local Projection Method for the Oseen Equation*, submitted to International Journal for Numerical Methods in Engineering, with Barrenechea, G.R.
- *Consistent Local Projection Stabilized Finite Element Methods*, submitted to SIAM Journal on Numerical Analysis, with Barrenechea, G.R.
- *On a Hierarchical Estimator Driven by a Stabilized Method for the Navier–Stokes Equations*, submitted to Numerical Methods for PDE, with Araya, R. and Poza, A.
- *A Residual Local Projection Method for the Oseen Equation*, to appear in Computer Methods in Applied Mechanics and Engineering, with Barrenechea, G.R.
- *A Two-Level Enriched Finite Element Method for a Mixed Problem*, to appear in Mathematics of Computation, with Allendes, A, Barrenechea, G.R. and Hernandez, E.
- *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*, Numerische Mathematik, No. 92, pp. 653-677, 2002, with Barrenechea, R.G.
- *New Wall Laws for the Unsteady Incompressible Navier-Stokes Equations*, M2AN, 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*, Surikaiseikikenkyusho, 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.

#### *Books and Chapter of Books*

- *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.

#### *Proceedings in Symposia and Conferences*

- *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*, 3rd 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 for 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, Tchech Republic, 2003, with Franca, L.P., Madureira, A.L. and Ramalho, J.
- *An a Posteriori Error Estimate for a Singularly Perturbed Problem*, ENUMATH 2003, Prague, Tchech 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*, ENUMATH 2001, Ischia, Italy, July 23-28, 2001, with Madureira, A. L.
- *A Stabilized Finite Element Method for a Generalized Stokes Problem*, 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, 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 Advection-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, Jyväskylä, 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<sup>ème</sup> Congrès 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 occasion 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<sup>ème</sup> Congrès 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<sup>ème</sup> Congrès 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.

*Technical Reports*

- *Convergence Analysis of a Multiscale Finite Element Method*, Report of LNCC, with Franca L.P., Madureira A.L., and Tobiska L., 2005
- *Multiscale and Residual-Free Bubble Functions for Reaction-Advection-Diffusion Equations*, Report of LNCC, with Franca L.P. and Ramalho J., 2004
- *A Multiscale A Priori Error Estimate*, Report of LNCC, with Araya R., 2003
- *Towards Multiscale Functions: Enriching Finite Element Spaces with Local but not Bubble-Like Functions*, Report of LNCC, with Franca L.P., Madureira A.L., 2003
- *An Unusual Stabilized Finite Element Method for a Generalized Stokes Problem*, Report of LNCC, with Barrenechea G., 2001
- *Analysis of Curvature Influence of Effective Boundary Conditions*, Report of LNCC, with Madureira A.L., 2001
- *On an Improved Unusual Stabilized Finite Element Method for the Advective-Reactive-Diffusive Equation*, Report of University of Colorado at Boulder, USA, 1999 (or Report of Laboratório Nacional de Computação Científica - LNCC, Brazil, No 09/99, 1999, with Franca L.P.
- *Méthode d'élément Finis Stabilisée pour les équations de Navier-Stokes Incompressible avec des Conditions aux Limites équivalentes*, Rapport de Recherche INRIA, No. 3480, 1998
- *Construction des Lois de Paroi d'Ordre 1 et 2 pour des Domaines Rugueux par Analyse Asymptotique*, Rapport de Recherche INRIA, No. 3357, 1998, with Achdou Y. and Pironneau O.
- *Étude des Lois de Paroi d'Ordre 1 et 2 pour des Domaines Rugueux par Décomposition de Domaine*, Rapport de Recherche INRIA, No. 3326, 1997, with Achdou Y. and Pironneau O.
- *Simulation des Écoulements Compressibles Turbulents sur Parois Rugueuses*, Rapport de Recherche INRIA, No. 3108, 1997, with Mohammadi B. and LeTallec P.
- *Combining Stabilized Finite Element Methods*, Report of University of Colorado at Boulder, 1995, with Franca L.P.

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## AWARDS

- 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 AND SCHOLARSHIPS

- 01/2010-01/2012 Grant by CNPq/Brazil, to develop researched related to the relationship between enriched and discontinuous finite element methods
- 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 National de Recherche en Informatique et en Automatique - INRIA, France, to visit the Institut National 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 National de Recherche en Informatique et en Automatique - INRIA, France, to visit the University of Colorado at Boulder
- 1995-1998 Scholarship to pursue Ph.D. studies, CNPq, Brazil
- 1993–1994 Scholarship to pursue M.Sc. studies, CNPq, Brazil
- 1990–1992 Undergraduated scholarship, CNPq, Brazil

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#### SHORT TERM VISITING POSITION

- 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

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## TEACHING EXPERIENCE

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)

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## GRADUATE STUDENTS

- Ph.D. Thesis, Carla Bertolucci Fiadi, *Modelagem e Resolução Numérica de Fenômenos Biológicos*, LNCC - Brazil, 03/2009 -
- Ph.D. Thesis, Diego Paredes, *Consistent Local Stabilized Projection Methods for Transport Equations*, LNCC - Brazil, Adviser, 03/2009-
- Ph.D. Thesis, Abner Poza, *A Posteriori Error Estimators for Fluids*, University of Concepcion, Chile, Co-Adviser, 07/2008-
- Ph.D. Thesis, Christopher Harder, *Analysis of Enriched Petrov-Galerkin Finite Element Methods for Porous Media Problems*, University of Colorado at Denver - USA, Co-Adviser, 08/2005-
- Ph.D. Thesis, Honório Fernando, *Constructing Multiscale Finite Element Methods for Biot Models*, LNCC - Brazil, 07/2004-
- Ph.D. Thesis, Jairo Ramalho, *New Enriched Finite Element Methods for Unsteady Reaction-Advection-Diffusion Problems.*, LNCC - Brazil, 03/2001-12/2005

Petrópolis, Brazil, January 22, 2010