

CURRICULUM VITAE¹

PICASSO Marco,
Professeur Titulaire,
Mathematics Institute of Computational Science and Engineering,
Faculté des Sciences de Base,
Ecole Polytechnique Fédérale de Lausanne
Born 1963, Swiss/French, married, 3 children.

Research

My research consists in i) modeling complex physical phenomena and engineering processes using partial differential equations ii) proposing and studying (from the theoretical viewpoint) efficient numerical methods for solving partial differential equations iii) implementing these methods on computers and validating the numerical results.

Teaching

I am teaching analysis at bachelor level, numerical analysis and scientific computing at bachelor, master and doctoral levels.

Keywords

Partial Differential Equations - Numerical Analysis -
Scientific Computing - Adaptive Finite Elements -
Fluid Flow - Free Surfaces

¹July 2015

Academic Positions

- 2010-: Professeur Titulaire in the Institute SB-MATHICSE, head of research group with 8 full-time positions.
- 2009-2010: Invited Professor at INRIA Rocquencourt, Paris, France.
- 2005-2009: Maître d'Enseignement et de Recherche in the Chair SB-IACS-ASN.
- 1993-2005: "Adjoint Scientifique" in the Chair SB-IACS-ASN. In charge of Scientific Computing. Thesis supervision. Lecturer.
- 1992: Postdoctoral Fellow, LMPH-DMX (Prof. W. Kurz and M. Rappaz).
- 1988-92: Assistant in the Chair of Prof. J. Rappaz.

Education

- 1988-92: PhD thesis nb. 1011 "Simulation numérique des traitements de surface par laser", Supervisor Prof. J. Rappaz.
- 1986-87: D.E.S.S. (Master Degree) in Applied Mathematics, University of Besançon, France.
- 1981-86: "Arts et Métiers" Engineering Diploma, ECAM Lyon, France.

RESEARCH ACTIVITIES

My research consists in:

- **Modeling** complex physical phenomena and engineering processes with partial differential equations.
- Proposing and studying (from the theoretical viewpoint) efficient **numerical** methods for solving partial differential equations.
- **Implementing** these methods on computers and validating the theoretical predictions.

More precisely, I am currently studying the following problems:

- **Adaptive finite elements** (1992-present): a posteriori error estimates and anisotropic, adaptive finite elements for solving partial differential equations, with application to engineering and industrial problems.
- **Free surface flows** (1997-present): incompressible fluid flows with complex free boundaries, with applications to water reservoirs, sedimentation, viscoelastic flows, dynamics of glaciers.
- **Numerical modelling of aluminium production** (2003-present): computational magnetohydrodynamics for the aluminium industry.
- **Solidification processes** (1988-2007): laser surface treatments, phase change problems, dendritic growth and coalescence.

FUNDING

I have ongoing projects with the following academic institutions or industrial companies:

- **Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie**, ETHZ (since 1999): glacier modelling (with M. Funk) and impulse waves (with R. Boes and W. Hager), SNF project <http://p3.snf.ch/project-143470>
- **Rio Tinto - AlCan company**, Saint-Jean-De-Maurienne, France (since 2003): aluminium productions cells.
- **Ycoorsystems company**: complex free surface flows, CTI project.
- **Akselos company**: reduced basis, CTI project.

PUBLICATIONS

MOOC

- M. Picasso, *Analyse numérique pour ingénieurs*, coursera, first session Feb. 2013, second session Feb. 2014, third session Feb. 2015, first coursera course in french, 400 internal students, 100 external certificates for each session.

Teaching Book

- J. Rappaz, M. Picasso, *Introduction à l'analyse numérique*, Presses Polytechniques Universitaires Romandes, Lausanne (1998), more than 4000 books sold.

Peer Reviewed Papers

(Web of Science: h-index 17, 60 papers, 961 citations, without self-citations 813)

- M. Picasso, A.F.A. Hoadley, *Finite element simulation of laser surface treatments including convection in the melt pool*, Int. J. Num. Meth. Heat Fluid Flow, 4 (1994) 61–83.
- M. Picasso, C. Marsden, J.-D. Wagnières, A. Frenk, M. Rappaz, *A simple but realistic model for the laser cladding process*, Metallurgical Transactions, 25B (1994) 281-291.
- M. Picasso, M. Rappaz, *Laser-powder-material interactions in the laser cladding process*, Journal de Physique III, 4 (1994) 27-34.
- M. Picasso, *An adaptive finite element algorithm for a 2d stationary Stefan-like problem*, Comput. Meth. Appl. Mech. Eng., 124 (1995) 213-230.
- J. Medina, M. Picasso, J. Rappaz, *Error estimates and adaptive finite elements for nonlinear diffusion-convection problems*, M3AS 6 (1996) 689-712.
- M. Laso, M. Picasso, H.C. Öttinger, *2D time-dependent viscoelastic flow calculations using CONNFFESSIT*, AIChE. J., 43 (1997) 877-892.
- M. Bossy, D. Talay, M. Picasso, *Probabilistic numerical methods for physical and financial problems*, Computer in Physics, 11 (1997) 325-329.
- M. Picasso, *An adaptive finite element algorithm for a two-dimensional parabolic problem*, Comput. Meth. Appl. Mech. Eng., 167 (1998) 223-237.
- J. Bonvin, M. Picasso, *Variance reduction methods for CONNFFESSIT-like simulations*, J. Non Newtonian Fluid Mech., 84 (1999) 191-215.

- V. Maronnier, M. Picasso, J. Rappaz, *Numerical Simulation of Free Surface Flows*, J. Comp. Phys, 155 (1999) 439-455.
- J. Bonvin, M. Picasso, R. Stenberg, *GLS and EVSS methods for viscoelastic flows*, Comput. Meth. Appl. Mech. Eng., 190(2001) 3893-3914.
- M. Picasso, J. Rappaz, *Stability of time-splitting schemes for the Stokes problem with stabilized finite elements*, Numer. Meth. Partial Diff. Equations., 17-6(2001) 632-656.
- M. Picasso, J. Rappaz, *Existence, a priori and a posteriori error estimates for a nonlinear three fields problem arising from Oldroyd-B viscoelastic flows*, RAIRO M2AN, 35-2(2001) 879-897.
- J. Bonvin, M. Picasso, *A finite element/ Monte-Carlo method for polymer dilute solutions*, Computing and Visualization in Science, 4(2001) 2, 93-98.
- J. Bonvin, M. Picasso, *Mesoscopic Models for Viscoelastic flows: Coupling Finite Element and Monte-Carlo Methods*, Monte-Carlo Methods and Applications, 8(2002)1, 73-82.
- P. Degond, M. Lemou, M. Picasso, *Viscoelastic fluid models derived from kinetic equations for polymers*, SIAM J. Appl. Math., 62(2002)2, 1501-1519.
- M. Picasso, *Numerical study of the effectivity index for an anisotropic error indicator based on Zienkiewicz-Zhu error estimator*, Commun. Numer. Methods Engrng., 19(2003)1, 13-23.
- O. Kruger, M. Picasso, J.-F. Scheid, *A posteriori error estimates for a phase-field model arising from the solidification of a binary alloy*, Comp. Meth. Appl. Mech. Eng., 192(2003)5-6, 535-558.
- M. Picasso, *An anisotropic error indicator based on Zienkiewicz-Zhu error estimator: application to elliptic and parabolic problems*, SIAM J. Sci. Comp., 24(2003)4, 1328-1355.
- E. Burman, M. Picasso, *Anisotropic, adaptive finite elements for the computation of a solutal dendrite*, J. Interfaces and Free Boundaries, 5(2003), 103-127.
- V. Maronnier, M. Picasso, J. Rappaz, *Numerical Simulation of 3D Free Surface Flows*, Int. J. Numer. Methods Fluids, 42-7(2003), 697-716.
- S. Micheletti, S. Perotto, M. Picasso, *Stabilized finite elements on anisotropic meshes: a priori error estimates for advection-diffusion and Stokes problems*, SIAM J. Numer. Anal., 41-3(2003), 1131-1162.
- E. Grande, M. Laso, M. Picasso, *Calculation of variable-topology free surface flows using CONNFFESSIT*, J. Non-Newtonian Fluid Mech., 113-2(2003), 127-145.
- M. Picasso, J. Rappaz, A. Reist, M. Funk, H. Blatter, *Numerical simulation of the motion of a two dimensional glacier*, Int. J. Numer. Methods Eng., 60(2004), 995-1009.
- E. Burman, A. Jacot, M. Picasso, *Adaptive finite elements with high aspect*

ratio for the computation of coalescence using a phase-field model, J. Comput. Phys., 195-1(2004), 153-174.

- M. Laso, J. Ramirez, M. Picasso, *Implicit micro-macro methods*, J. Non-Newtonian Fluid Mech., 122(2004), 215-226.
- A. Caboussat, M. Picasso, J. Rappaz, *Numerical simulation of free surface incompressible liquid flows surrounded by compressible gas*, J. Comput. Phys., 203-2(2005), 626-649.
- M. Picasso, *An adaptive algorithm for the Stokes problem using continuous, piecewise linear stabilized finite elements and meshes with high aspect ratio*, Applied Numer. Math., 54-3(2005), 470-490.
- A. Bonito, M. Picasso, M. Laso, *Numerical Simulation of 3D viscoelastic flows with free surfaces*, J. Comp. Phys., 215(2006), 691-716.
- A. Bonito, Ph. Clément, M. Picasso, *Mathematical analysis of a stochastic simplified Hookean dumbbells model arising from viscoelastic flow*, J. Evol. Eq., 6-3(2006), 381-398.
- M. Picasso, *Anisotropic a posteriori error estimates for an optimal control problem governed by the heat equation*, Int. J. Numer. Methods PDE, 22(2006), 1314-1336.
- M. Picasso, *Adaptive finite elements with large aspect ratio based on an anisotropic error estimator involving first order derivatives*, Comput. Methods. Appl. Mech. Eng., 196(2006), 14-23.
- A. Bonito, Ph. Clément, M. Picasso, *Finite element analysis of a simplified stochastic Hookean dumbbells model arising from viscoelastic flows*, ESAIM M2AN, 40-4(2006), 785-814.
- J. Narski, M. Picasso, *Adaptive finite elements with high aspect ratio for dendritic growth of a binary alloy including fluid flow induced by shrinkage*, Comput. Methods. Appl. Mech. Eng., 196(2007), 3562-3576.
- J. Narski, M. Picasso, *Adaptive 3D finite elements with high aspect ratio for dendritic growth of a binary alloy including fluid flow induced by shrinkage*, Fluid Dyn. Mater. Process., 3(2007), 49-64.
- A. Bonito, Ph. Clément, M. Picasso, *Mathematical and numerical analysis of a simplified time-dependent viscoelastic flow*, Numer. Math., 107(2007), 213-255.
- M. Picasso, J. Rappaz, V. Rezzonico, *Multiscale algorithm with patches of finite elements*, Math. Comput. Simulation, 76(2007), 181-187.
- V. Rezzonico, A. Lozinski, M. Picasso, J. Rappaz, J. Wagner, *Multiscale algorithm with patches of finite elements*, Comm. Numer. Meth. Eng., 42-6(2008), 477-491.
- Y. Bourgault, M. Picasso, F. Alauzet, A. Loseille, *On the use of anisotropic a posteriori error estimators for the adaptative solution of 3D inviscid compressible flows*, Int. J. Numer. Methods Fluids, 59-1(2008), 47-74.

- G. Jouvet, M. Picasso, J. Rappaz, H. Blatter *A new algorithm to simulate the dynamics of a glacier: theory and applications*, J. Glaciology, 54-118(2008), 801-811.
- M. Fluck, T. Hofer, M. Picasso, J. Rappaz, G. Steiner *Scientific computing for aluminum production*, Int. J. Numer. Analysis Modeling, 6-3(2009), 489-504.
- M. Picasso, *A stopping criteria for the conjugate gradient algorithm in the framework of adaptive finite elements*, Comm. Numer. Meth. Eng., 25-4(2009), 339-355.
- G. Jouvet, M. Huss, H. Blatter, M. Picasso, J. Rappaz *Numerical simulation of Rhonegletscher from 1874 to 2100*, J. Comput. Phys., 228(2009), 6426-6439.
- A. Lozinski, M. Picasso, V. Prachittham *An anisotropic error estimator for the Crank-Nicolson method: application to a parabolic problem*, SIAM J. Sci. Comp., 31-4(2009), 2757-2783.
- M. Picasso, V. Prachittham, M.A.M. Gijs *Adaptive finite elements with large aspect ratio for mass transport in electroosmosis and pressure-driven microflows*, Int. J. Numer. Methods Fluids, 2009.
- M. Picasso, V. Prachittham *An adaptive algorithm for the Crank-Nicolson scheme applied to a time-dependent convection-diffusion problem*, J. Comput. Applied Math., 233(2009), 1139-1154.
- M. Picasso, V. Prachittham, M. Gijs *Adaptive finite elements with large aspect ratio for mass transport in electroosmosis and pressure-driven microflows*, J. Numer. Meth. Fluids, 63(2010), 1005-1030.
- M. Flueck, A. Janka, C. Laurent, M. Picasso, J. Rappaz, G. Steiner *Some Mathematical and Numerical Aspects in Aluminum Production*, J. Sci. Comp. 43(2010), 313-325.
- M. Picasso, *Numerical study of an anisotropic error estimator in the $L^2(H^1)$ norm for the finite element discretization of the wave equation*, SIAM J. Sci. Comp. 32(2010), 2213-2234.
- M. Picasso, F. Alauzet, H. Borouchaki, P.-L. George *A numerical study of some Hessian recovery techniques on isotropic and anisotropic meshes*, SIAM J. Sci. Comp. 33(2011), 1058-1076.
- G. Jouvet, M. Picasso, J. Rappaz, M. Huss, M. Funk, *Modelling and numerical simulation of the dynamics of glaciers including local damage effects*, Math. Model. Nat. Phenom. 6 (2011), no. 5, 263280.
- Y. Bourgault, M. Picasso, *Anisotropic error estimates and space adaptivity for a semidiscrete finite element approximation of the transient transport equation*, SIAM J. Sci. Comp. 35(2013) A1192-A1211.
- M. Jaber, H. Blatter, M. Picasso, *Measurement of strain-rate components in a glacier with embedded inclinometers: numerical analysis*, J. Glaciology

59-215 (2013) 499-502.

- L. Michel, M. Picasso, D. Farinotti, A. Bauder, M. Funk, H. Blatter, *Estimating the ice thickness of mountain glaciers with an inverse approach using surface topography and mass-balance*, Inverse Problems 29 (2013) 035002 .
- S. Boyaval, M. Picasso, *A posteriori analysis of the Chorin-Temam scheme for Stokes equations*, CRAS, 351 (2013) 931-936.
- L. Michel, M. Picasso, D. Farinotti, M. Funk, H. Blatter, *Estimating the ice thickness of shallow glaciers from surface topography and mass-balance data with a shape optimization algorithm*, Computers & Geosciences, 66 (2014) 182-199.
- L. Michel, M. Picasso, D. Farinotti, A. Bauder, M. Funk, H. Blatter, *Estimating the ice thickness of mountain glaciers with a shape optimization algorithm using surface topography and mass-balance*, J. inverse ill-posed problems, 22-6 (2014) 787-818.
- N. James, S. Boyaval, A. Caboussat, M. Picasso, *Numerical simulation of 3D free surface flows, with multiple incompressible immiscible phases. Applications to impulse waves*, Int. J. Numer. Methods Fluids, 76-12 (2014) 1004-1024.
- W. Hassan, M. Picasso, *An anisotropic adaptive finite element algorithm for transonic viscous flows around a wing*, Computer & Fluids, 111 (2015) 33-45.

Peer Reviewed Contributions in Books

- J. Bourgeois, P.A. Chevalier, M. Picasso, J. Rappaz, R. Touzani, *Magneto hydrodynamic problem in the aluminium industry*, in Finite Elements in Fluids, Vol. 8 (T.J. Chung, ed.), Series in Computational and Physical Processes in Mechanics and Thermal Sciences, Hemisphere publ. corp., Washington (1992) 479-508.
- A.F.A. Hoadley, M. Picasso, M. Rappaz, *Modelling of solidification phenomena in processes involving a moving heat source*, in Mathematical Modelling of Weld Phenomena (K.E. Easterling H. Cerjak, ed.), The Institute of Materials, 1 Carlton House Terrace, London SW1Y 5DB (1993) 60-71.
- M. Laso, M. Picasso, H.C. Öttinger, *Calculation of flows with large elongational components: CONNFFESSIT calculation of the flow of a FENE fluid in a planar 10:1 contraction*, in Flexible Polymer Chains in Elongational Flows (Nguyen, Kausch ed.), Springer (1999) 101-135.
- A. Caboussat, V. Maronnier, M. Picasso, J. Rappaz, *Numerical simulation of 3D free surface flows*, Lecture Notes in Computational Science and Engineering, Springer Vol. 35 (2003) 69-86.

- P. Degond, M. Lemou, M. Picasso, *Constitutive relations for viscoelastic fluid models derived from kinetic theory*, The IMA volumes in mathematics and its applications, Vol. 136 Springer (2004) 77-90.
- E. Burman, M. Picasso, J. Rappaz, *Analysis and computation of dendritic growth in binary alloys using a phase-field model*, Numerical mathematics and advanced applications, 204–220, Springer, 2004.
- J. Narski, M. Picasso, *Adaptive finite elements with high aspect ratio for dendritic growth of a binary alloy including fluid flow induced by shrinkage*, Int. Ser. Numerical Mathematics, Vol. 154, 327-337, Birkhauser, 2006.
- R. Glowinski, J. He, A. Lozinski, M. Picasso, J. Rappaz, V. Rezzonico, J. Wagner, *Finite element with patches and applications*, Lect. Notes Comput. Sci. Eng., Vol. 55 Springer, 2007, 77-89.
- A. Caboussat, M. Picasso, J. Rappaz, *Modeling and simulation of liquid-gas free surface flows*. Free and moving boundaries, Lect. Notes Pure Appl. Math., 252, Chapman Hall, 2007, 111–124.
- A. Bonito, A. Caboussat, M. Picasso, J. Rappaz, *Modeling and simulation of liquid-gas free surface flows*. Partial differential equations: modelling and numerical simulation, Computational methods in applied sciences, Springer, 2008, 187-208.
- F. Alauzet, W. Hassan, M. Picasso, *Goal Oriented, Anisotropic, A Posteriori Error Estimates for the Laplace Equation*, Numerical Mathematics and Advanced Applications 2009, Springer, 2010.
- A. Bonito, P. Clément, M. Picasso, *Viscoelastic flows with complex free surfaces: numerical analysis and simulation*. Handbook of Numerical Analysis, Elsevier, 2011.
- A. Caboussat, G. Jovet, M. Picasso, J. Rappaz, *Numerical Algorithms for Free Surface Flow*. Computational Fluid Dynamics, Chapman Hall, F. Magoules Ed., 2011.

THESIS SUPERVISION

- J. Bonvin, PhD thesis number 2249 (2000), *Numerical simulation of viscoelastic fluids with mesoscopic models*.
- A. Bonito, PhD thesis number 3490 (2006) *Analysis and numerical simulation of viscoelastic flows: deterministic and stochastic models*.
- V. Rezzonico, thesis EPFL number 3782 (2007), *Multiscale algorithms with patches of finite elements and applications*.
- J. Narski, thesis EPFL number 3867 (2007), *Adaptive finite element simulations of dendritic growth including fluid flow induced by shrinkage*.
- V. Prachittham, thesis EPFL number 4338 (2009), *Space-time adaptive algorithms for parabolic problems: a posteriori error estimates and application to microfluidics*.
- G. Jovet, thesis EPFL number 4677 (2010), *Modélisation, analyse mathématique et simulation numérique de la dynamique des glaciers*.
- W. Hassan, thesis EPFL number 5304 (2012), *Algorithmes d'adaptation de maillages anisotropes et application à l'aérodynamique*.
- S. Flotron, thesis EPFL number 5738 (2013) *Simulations numériques de phénomènes MHD-thermiques avec interface libre dans l'électrolyse de l'aluminium*.
- L. Michel, thesis EPFL number 5940 (2013) *Estimating the Ice Thickness of Mountain Glaciers from Surface Topography and Mass-Balance Data*.
- V. Laurmaa, *Numerical simulation of 3D impulse waves*, started march 2012.
- J. Rochat, *Fluid flow models for MHD*, started october 2012.
- D. Guignard, *PDE's with small uncertainties*, started october 2012.
- S. Dubuis, *Adaptive methods for two immiscible fluids*, started april 2014.

THESIS EXPERTISE

- D. Eyheramendy, thesis EPFL number 1752 (1997), *Object-oriented finite element programming symbolic derivations and automatic programming.*
- O. Diallo, thesis Lyon 1 (2000), *Modélisation et simulation numérique de résines réactives dans un milieu poreux.*
- V. Maronnier, thesis EPFL number 2248 (2000), *Simulation numérique d'écoulements de fluides incompressibles avec surface libre.*
- S. Commend, thesis EPFL number 2391 (2001), *Stabilized finite elements in geomechanics.*
- S. Gyger, thesis EPFL number 2580 (2002), *A statistical approach to hedge funds selection and portfolio construction.*
- P. Zunino, thesis EPFL number 2669 (2002), *Mathematical and numerical modeling of mass transfer in the vascular system.*
- S. Del Pino, thesis Paris VI (2002), *Une méthode d'éléments finis pour la résolution d'EDP dans des domaines décrits par géométrie constructive.*
- A. Caboussat, thesis EPFL number 2893 (2003), *Mathematical and numerical simulation of free surface flows.*
- Y. Gati, thesis Ecole Nationale des Ponts et Chaussées (2004), *Modélisation mathématique et simulation numérique de fluides non newtoniens.*
- Y. Rouchdy, thesis INSA Lyon (2005), *Segmentation automatique et suivi du mouvement du coeur par modèles déformables élastiques en imagerie par résonance magnétique.*
- A. Reist, thesis EPFL number 3184 (2005), *Mathematical analysis and numerical simulation of the motion of a glacier.*
- Y. Safa, thesis EPFL number 3185 (2005), *Simulation numérique des phénomènes thermiques et magnétohydrodynamiques dans une cellule de Hall-Héroult.*
- D. Mastalli, thesis EPFL (2006), *Optimal control of mass transfer in peritoneal dialysis.*
- N. Soualem, thesis Valenciennes (2007), *Estimateurs d'erreur à posteriori pour des problèmes dynamiques.*
- M. Saadouni, thesis Paris VI (2007), *Un modèle instationnaire bidimensionnel de fluide de grade deux.*
- M. Djenno Ngomanada, thesis Clermont-Ferrand (2007), *Nouvelles approximations numériques pour les équations de Stokes et l'équation level set.*
- C. Winkelmann, thesis EPFL number 3971 (2007), *Interior penalty finite element approximation of Navier-Stokes equations and application to free surface flows.*
- B. Stamm, thesis EPFL number 4135 (2008), *Stabilization strategies for discontinuous Galerkin methods.*

- E. Zeltz, thesis INSA Lyon (2008), *Modèles d'injection multi-phasiques en milieux poreux*.
- M. Preisig, thesis EPFL number 4250 (2008), *Modeling two-phase flows on moving domains*.
- R. Bouamra, thesis Paris VI (2009), *Mise en oeuvre de la méthode des domaines fictifs de simulation pour l'étude des écoulements fluide-particule. Application à l'industrie pétrolière*.
- O. Malaspinas, thesis EPFL number 4505 (2009), *Lattice Boltzmann method for the simulation of viscoelastic fluid flows*.
- V. Lleras, thesis Univ. Franche-Comté Besançon (2009), *Modélisation, analyse et simulation de problèmes de contact en mécanique des solides et des fluides*.
- S. Boyaval, thesis Ecole des Ponts et Chaussées- Univ. Marne La Vallée (2009), *Modélisation mathématique et simulation numérique en sciences des matériaux*.
- E. Renaut, thesis Univ. Technologique Troyes (2009), *Reconstruction de la topologie et génération de maillage de surfaces composées de carreaux paramétrés*.
- I. Cheddadi, thesis LJK Grenoble (2010), *Modélisation numérique d'écoulements de mousse*.
- M.-A. Habisreutinger, thesis EPFL number 4818, *Grid Filter Models for the Large Eddy Simulation of Fluid Flows*.
- A. Laadhari, thesis LJK Grenoble (2011), *Modélisation numérique de la dynamique des globules rouges par la méthode des fonctions de niveau*.
- N. Morcos, thesis Paris VI (2011), *Modélisation mathématique et simulation de systèmes microvasculaires*.
- P. Crosetto, thesis EPFL (2011), *Fluid-Structure Interaction Problems in Hemodynamics: Parallel Solvers, Preconditionners and Applications*.
- H. Meidani, thesis EPFL (2013), *Phase-field modeling of micropore formation in a solidifying alloy*.
- N. Martin, thesis INSA Toulouse (2013), *Modélisation directe et inverse d'écoulements géophysiques par méthodes variationnelles - Application à la glaciologie*.
- C. Effenberger, thesis EPFL (2013), *Robust Solution Methods for Nonlinear Eigenvalue Problem*.
- R. Popescu, thesis EPFL (2013), *Parallel algorithms and efficient implementation techniques for finite element approximations*.
- E. Mbinky, thesis Paris VI (2013), *Adaptation de maillages pour des interpolations d'ordre très élevé*.
- M. Ibrahim, thesis Belfort (2013), *Algorithmes de gestion en ligne des flux énergétiques dans les véhicules hybrides électriques*.

- J. Veysset, thesis Ecole des Mines de Paris (2014), *Anisotropic mesh adaptation and stabilized finite elements for solving conjugate heat transfers and turbulent flows.*
- D. den Ouden, thesis TU Delft (2014), *Mathematical modelling of nucleating and growing precipitates: distributions and interfaces.*
- C. Vessaz, thesis EPFL 6470 (2015), *Finite Particle Flow Simulation of Free Jet Deviation by Rotating Pelton Buckets.*
- S. Basterrechea, thesis EPFL (2015), *Application aux EDP d'une methode par point fixe et le problme des deux puits.*
- A. Blumenthal, thesis EPFL (2015), *Stabilized numerical methods for stochastic differential equations driven by diffusion and jump-diffusion processes.*

INVITED SEMINARS AND CONFERENCES

- Invited speaker at the Eureka 194 workshops (modelling of laser material processing), 1990, 1991, 1992, 1993.
- Invited speaker at 3rd Int. Conf. Laser M2P Lyon, dec. 1993.
- Numerical analysis seminar, Mathematics Department, Université de Rennes, nov. 1994.
- Numerical analysis seminar, Mathematics Department, Université de Lyon, sept. 1995.
- Probability seminar INRIA Sophia-Antipolis, may 1996, may 1997.
- Numerical analysis seminar, Mathematics Department, Politecnico di Torino, march 1997.
- Invited speaker at the numerical analysis workshop, Sion, sept. 1997.
- Numerical analysis seminar, Mathematics Department, Pontificia Universidad Católica de Chile, june 1998.
- Numerical analysis seminar, Mathematics Department, Université de Grenoble, oct. 1998.
- Applied mathematics seminar, Mathematics Department, Université de Toulouse, nov. 1998.
- Numerical analysis seminar, Mathematics Department, Université de Clermont-Ferrand, dec. 1998.
- Numerical analysis seminar, Mathematics Department, Université de Chambéry, jan. 1999.
- Numerical analysis seminar, Mathematics Department, Université de Rennes, sept. 1999.
- Invited speaker at the Conference on Numerical Methods for Evolution PDE's, Crete, june 2000.
- Invited speaker at the workshop of Non-newtonian and Viscoelastic Fluid Flow, Scuola Normale Superiore, Pisa, october 2000.
- Numerical analysis seminar, Mathematics Department, Université de Lyon, feb. 2001.
- Invited speaker at the Conference "Méthodes particulières de simulation numérique" Le Bourget-du-Lac, may 2001.
- Numerical analysis seminar, Mathematics Department, Politecnico di Milano, oct. 2001.
- Numerical analysis seminar, Mathematics Department, Université de Besançon, march 2002.
- Plenary speaker at the AMIF Conference, Lisboa, april 2002.
- Invited speaker at the CISC Conference, Wias, Berlin, oct. 2002.

- Numerical analysis seminar, CERMICS, Ecole Nationale des Ponts et Chaussées, Paris, nov. 2002.
- Numerical analysis seminar, Delft University, nov. 2003.
- Stochastics and PDE seminar, Delft University, nov. 2003.
- Numerical analysis seminar, Oxford University, feb. 2004.
- Invited speaker at the workshop “Self-Adaptive Methods for PDE”, Mathematisches Forschungsinstitut Oberwolfach, march 2004.
- Invited speaker at the workshop “Computation for Multiscale Problems in Physics”, Warwick University, april 2004.
- Invited speaker at the Ecoles CEA-EDF-INRIA “Estimation a posteriori et validation de calculs”, sept. 2004, INRIA, Rocquencourt, France.
- Invited speaker at the workshop “Numerical Solution of Evolution Equations” Crete, sept. 2004.
- Invited speaker at the mini-workshop “Interface Problems in Computational Fluid Dynamics”, Mathematisches Forschungsinstitut Oberwolfach, feb. 2005.
- Numerical analysis seminar, ETH-Zürich, feb. 2005.
- Numerical analysis seminar, Lyon, may 2005.
- Invited speaker for the session “Analysis and Computation for Interscale Problems” at the conference “Free Boundary Problems”, Coimbra, june 2005.
- Numerical analysis seminar, Montpellier, june 2005.
- Invited speaker at the session “A Posteriori Error Estimation and Adaptive Procedures from 1976 to 2005. Symposium in Honor of Prof. Ivo Babuska” at the conference “US National Congress on Computational Mechanics”, Austin, july 2005.
- Invited speaker at the conference “Trends in Numerical and Physical Modeling for Industrial Multiphase Flows”, Corsica, september 2005.
- Numerical analysis seminar, Sussex, jan. 2006.
- Numerical analysis seminar, Imperial College, jan. 2006.
- SAM Kolloquia, ETH-Zürich, may 2006.
- Invited speaker at the session “Anisotropic Finite Element Methods” at the conference “MAFELAP”, London, june 2006.
- Invited speaker at the Workshop “Non-Newtonian fluids”, Centre Interdisciplinaire Bernoulli, EPF-Lausanne, november 2006.
- Invited speaker at the “Journées Numériques de Besançon”, june 2007.
- Invited speaker at the workshop “Adaptive Finite Elements”, Mathematisches Forschungsinstitut Oberwolfach, june 2007.
- Invited speaker at the session “Monte-Carlo methods for SPDE” at the conference “ICIAM”, Zürich, july 2007.
- Invited speaker at the “International Workshop on Applied Mathematics and Computational Science, 60th Birthday of Prof. Takashi KAKO”, Tokyo,

sept. 2007.

- Invited speaker at the workshop “Viscoplastic fluids: from theory to applications”, Monte Verità, oct. 2007.
- Invited speaker at the mini-symposium 4, “Domain Decomposition 18”, Jerusalem, jan. 2008.
- Numerical analysis seminar, Graduate School of Mathematical Sciences, Tokyo, june 2008.
- First invited speaker at the conference “JST Presto Symposium on Mathematical Sciences towards Environmental Problems”, Sapporo, june 2008.
- Invited keynote speaker at the mini-symposium “Adaptive methods for material processing”, ECCOMAS 2008, Venice, jul. 2008.
- Numerical analysis seminar, Departement of Mathematics, Ottawa, sept. 2008.
- Invited speaker at the 4th workshop on “Numerical Methods for Evolution Equations”, Crete, sept. 2008.
- Invited speaker at the workshop “Rheology of complex fluids: modeling and numerics”, Paris, Ecole des Ponts et Chaussées, jan. 2009.
- HPC seminar, EPFL, may 2009.
- Plenary speaker at the conference “Enumath 2009”, Uppsala, jun. 2009.
- Invited speaker at the CCMX 2009 Summer School on Modelling in Materials Science, Lausanne, aug. 2009.
- Numerical analysis seminar, Paris VI, jan. 2010.
- Scientific computing seminar, INRIA Rocquencourt, jan. 2010.
- Seminar, EDF research center, Chatou, feb. 2010.
- Poems seminar, INRIA Rocquencourt, feb. 2010.
- Invited speaker at the workshop “Adaptation de maillages et estimation d’erreurs”, Québec, may 2010.
- Invited speaker at the “XIIIe colloque pan-qubécois des étudiants de l’ISM“, Québec, may 2010.
- Invited Speaker at the workshop “A posteriori error estimates and mesh adaptivity for evolutionary and nonlinear problems”, LJLL, Paris VI, july 2010.
- Invited speaker at the workshop “Tetraedron III”, Swansea, sept., 2010.
- MODANT Seminar, LJK, Grenoble, nov. 2010.
- Numerical Analysis Seminar, Texas A&M, jan. 2011.
- Numerical Analysis Seminar, Nice, jun. 2011.
- Invited Speaker at the workshop “Sevilla numerica, Sevilla, jun. 2011.
- Numerical Analysis Seminar, FU Berlin, oct. 2011.
- Plenary speaker at the “first International Conference on Frontiers in Computational Physics: Modeling the Earth System” Boulder CO, dec. 2012
- Numerical Analysis Seminar, INSA Lyon, mar. 2013.

- Plenary Speaker at the “Workshop on Error Estimates and Adaptive Mesh Refinement Strategies for Boundary Element Methods “, ENSTA Paris, may 2013.
- Invited speaker in the mini-symposium adaptive methods for CFD “25th biennial Conf. Numerical Analysis”, Strathclyde, june 2013.
- Invited speaker at “Tetrahedron IV”, Verbania, july 2013.
- Invited speaker in the mini-symposium Modelling, Analysis and Numerical Techniques for Viscoelastic Fluids, “ENUMATH 2013”, EPFL.
- Colloquium Lorrain de Mathématiques, Nancy, feb. 2014, .
- Invited speaker, “Retours d’expérience sur les MOOCs”, ENPC, Paris, feb. 2014.
- Invited speaker, “Quelques considérations sur un MOOC d’analyse numérique”, CANUM, apr. 2014.
- Speaker at the techday Lausanne, oct. 2014.
- Invited speaker at “Simulation and Optimization of Extreme Fluids”, Heidelberg, oct. 2014.
- Speaker at the techday Locarno, nov. 2014.
- Kolloquium, “Numerical simulation of the retreat of Alpine glaciers”, Erlangen, jan. 2015.
- Speaker at the techday Genève, apr. 2015.
- Invited speaker, “Semaine d’analyse numérique de Besanon”, june 2015.

Given Courses

- “Cours postgrade CAPA”, EPFL, oct. 1997, 20 hrs: méthodes de décomposition de domaines, algorithmes de maillage adaptatif, méthodes particulières.
- “DEA modélisation”, Lebanon, feb. 1998, 15 hrs: mise en oeuvre de la méthode des éléments finis.
- “Cours d’analyse numérique de 1er cycle” MT-MX, EPFL, 1998, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, oct. 1998, 20 hrs: estimations d’erreurs a priori et a posteriori pour la méthode des éléments finis.
- “DEA modélisation”, Lebanon, feb. 1999, 15 hrs: mise en oeuvre de la méthode des éléments finis, méthodes numériques pour les problèmes de diffusion-convection.
- “Cours d’analyse numérique de 1er cycle” MT-MX, EPFL, 1999, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, octobre 1999, 20 hrs.
- “Cours de 3e cycle d’analyse et simulation numérique des équations aux dérivées partielles”, EPFL, 1999, 20 hrs.
- “Cours d’analyse numérique de 1er cycle” EL-MT-MX, EPFL, 2000, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, 2000, 20 hrs.
- “Cours d’analyse numérique de 1er cycle” EL-MT-MX, EPFL, 2001, 42 hrs.
- “Cours d’analyse IV de 1er cycle” SSC, EPFL, 2001, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, 2001, 20 hrs.
- “Cours de 3e cycle d’analyse et simulation numérique des équations aux dérivées partielles”, EPFL, 2001, 20 hrs.
- “Cours d’analyse numérique de 1er cycle” EL-MT-MX, EPFL, 2002, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, 2002, 40 hrs.
- “DEA modélisation”, Lebanon, feb. 2003, 15 hrs: mise en oeuvre de la méthode des éléments finis, méthodes numériques pour les problèmes de diffusion-convection.
- “Cours d’analyse numérique de 1er cycle” EL-MT-MX, EPFL, 2003, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, 2003, 40 hrs.
- “Cours d’analyse numérique de 1er cycle” EL-MT-MX, EPFL, 2004, 42 hrs.
- “Cours postgrade en ingénierie mathématique”, EPFL, 2004, 50 hrs.
- “Cours d’analyse numérique de 1er cycle” SSC, EPFL, 2005, 42 hrs.
- “Cours d’analyse numérique bachelor” GC-SIE, EPFL, winter 2005, 42 hrs.

- “Cours d’analyse numérique bachelor” PH-SSC, EPFL, summer 2006, 42 hrs.
- “Cours d’analyse numérique bachelor” GC-SIE, EPFL, winter 2006, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, winter 2006, 56 hrs.
- “A posteriori error estimates” Ecole Doctorale MA, EPFL, winter 2007, 14 hrs.
- “Cours d’analyse numérique bachelor” PH-SSC, EPFL, summer 2007, 42 hrs.
- “Cours d’analyse numérique master” MA, EPFL, summer 2007, 56 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2007, 56 hrs.
- “Stabilized finite elements” Ecole Doctorale MA, EPFL, autumn 2007, 28 hrs.
- “Cours d’analyse numérique bachelor” PH, EPFL, spring 2008, 42 hrs.
- “Cours d’analyse numérique master” MA, EPFL, spring 2008, 56 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2008, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, autumn 2008, 56 hrs.
- “Cours d’analyse numérique bachelor” PH, EPFL, spring 2009, 42 hrs.
- “Cours d’analyse numérique bachelor” GM, EPFL, spring 2009, 42 hrs.
- “Cours d’analyse numérique master” MA, EPFL, spring 2010, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM, EPFL, spring 2010, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2010, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, autumn 2010, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM, EPFL, spring 2011, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2011, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, autumn 2011, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM-IC-IN, EPFL, spring 2012, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2012, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, spring 2013, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM-IC-IN, EPFL, spring 2013, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2013, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, spring 2014, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM-IC-IN, EPFL, spring 2014, 42 hrs.
- “Cours d’analyse III” GC-SIE, EPFL, autumn 2014, 56 hrs.
- “Cours d’analyse numérique master” MA, EPFL, spring 2015, 56 hrs.
- “Cours d’analyse numérique bachelor” PH-GM-IC-IN, EPFL, spring 2015, 42 hrs.

ADMINISTRATIVE DUTIES

- Representative of EPFL at the “Commission Suisse de Maturité”.
- President of APEL (EPFL Profs association).
- Reviewer for Mathematical Reviews.
- Reviewer for various journals in the field of numerical mathematics (more than 10 reviews/year).
- Reviewer for various National Funding Projects
- Reviewer for AERES France.
- Speaker in the “Journées d’accueil EPFL”, section MA.