

Fatiha Alabau: Curriculum Vitae

Full professor University of Lorraine
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Academic appointments

Since 09/1999 Full professor University of Lorraine
1997-1999 Full professor University Louis Pasteur, Strasbourg (mouve to Metz for family reasons)
1988-1997 Assistant professor University of Bordeaux I
august 1987- may 1988 Visiting assistant professor at Arizona State University
1984-1987 INRIA scholarship for the PhD thesis (Rocquencourt)
and 6 months CNRS delegation (leave) in 2004, 2008, 2010, 2011, 2014 and 2015

Degrees

1996 Habilitation, University Bordeaux I.
October 1987 PhD thesis, University Paris 6. Advisor Roland Glowinski.
D.E.A. of Numerical Analysis at University Paris 6 (1984, Mention B.), Maîtrise of Mathematics and Fundamental Applications (Univ Paris 6, 1983, Mention T. B.), Maîtrise of Pure Mathematics (Univ Paris 6 1983, Mention B.). Licence of Mathematics (Univ Paris 6, Mention Bien), DEUG SSM (univ Paris 6, Mention TB)

Current responsibilities

January 2016--december 2019 Member of the Publication Committee of the European Mathematical Society
Since July 2014-- President of the French Society of Applied and Industrial Mathematics (SMAI)
Since 2011- Member of the board of directors of SMAI
Since 2010- (renewed in 2014) Head for France of the GDRE CONEDP (CNRS-INdAM European Research Group) in control of PDE's between France and Italy. Carrier of the project. Created in January 2010. About 30 nodes in France and 26 in Italy
2011— Associate editor for Evolution Equations and Control Theory (EECT), American Institute of Mathematics and Sciences (AIMS)
2013—2016 Associate editor for ESAIM COCV, SMAI
2013-- Member of the Technical Committee of IFAC (International Federation of Automatic Control) on distributed parameter systems.
2016 International Program Committee (IPC) of the IFAC workshop on Control of Systems Governed by Partial Differential Equations 2016 (CPDE16), Bertinoro, Italy

Past responsibilities

2012-2015 Member of the hiring committee of the CNRS, section 41 (mathematics)
2007-2011 Member of the CNU (Conseil National des Universités), section 26
2011—2013 Member of the Education Commission of SMAI
2013-2014 co-head of the 2nd year Research Master, 2012-2014 Member of the Academic Senat and of the University Council for Education, 2004 -2008 Member of the Scientific Council of Metz University, member of the board of the President of Metz University, 2000-2004 Head of the research center in mathematics LMAM UMR 7122 at University of Metz. Creation of the CDRMM (research library in mathematics) and head in

2005-2006

2012-2014 Member of AERES evaluation committees of the research centers CEREMADE (Paris-Dauphine university), MAP5 (Paris-Descartes university), AGM (Cergy-Pontoise university)

2013 Member of the (enlarged) consortium of the prospective research group « MathsInTerre » (National Research Agency program) in the framework of the Year of Mathematics for the Planet Earth

2011 Member of the evaluation Panel for the INDAM post- doctoral fellowship program , 7th european program

Organization of conferences (main ones)

august 2015 Co-organization with Jean-Michel Coron of a mini-symposium « Control of partial differential equations », ICIAM 2015, august 10-14 2015, Beijing, China

april 2015 Co-organization of a Conference of the GDRE CONEDP and the Gran Sasso Institute (GSSI), april 22-24 2015, Gran Sasso Institute, L'Aquila, Italy

november 2013 MCPIT2013 "Modelling, Control, Inverse Problems for the Planet Earth", Conference of the GDRE CONEDP "Mathematics for the Planet Earth », november 18—22 2013, Institut Henri Poincaré, Paris. With a financial support of the city of Paris

november 2012 CNRS Thematic school CNRS on « Control of PDE's, interactions and applicative issues », november 5–9 november 2012, CIRM Luminy, France

october 2010 Organization of the Ceremony of Inauguration of the GDRE CONEDP at IHP, 12 october 2010 with a delegation of INdAM, representative of the INSMI and the Ministro Plenipotenziare of the italian embassy in Paris

january 2010 Conference of the GDRE CONEDP on Control of PDE's, january 25–29 2010, CIRM Luminy, France

september 2009 Conference of the GDRE CONEDP (before creation with a support of the CNRS) at the Institut Henri Poincaré (IHP), october 14-16 2009

november 2008 6th European-Maghreb Conference on Evolution Equations

Research interest

I work in control theory for PDE's. I am both interested by applied aspects and the elaboration of general methods to answer some important questions in the control of PDE's and ODE's which rely on intrinsic properties on the PDE's under study and are flexible and robust. I work on nonlinear and memory stabilization for dissipative PDE's and ODE's, uniform discretization of nonlinear damped PDE's, insensitizing control, observability/controlability/stabilization of coupled systems by a reduced number of controls, control questions for degenerate parabolic and hyperbolic PDE's, finite-time stabilization and more recently on some aspects of inverse problems.

I worked in the past on nonlinear analysis for coupled stationary systems of PDE's which models the transport of charges in semiconductors and in biology. I worked on uniqueness and multiplicity of solutions, singular perturbations analysis.

The methods I have developed rely on different parts of applied mathematics: analysis of PDE's, applied functional analysis, nonlinear analysis, convexity properties, energy methods, comparison principle, interpolation properties, ... and in the past on maximum principle, generalized maximum principle, nonlinear analysis for elliptic type systems and singular perturbation analysis.

Doctoral and post-doctoral students

2009-2013 Roberto Guglielmi Cotutelle thesis with University of Tor Vergata, « Stabilisation et contrôle des

équations aux dérivées partielles d'évolution ». Co-directed with P. Cannarsa. Prize "Rendiconti di Matematica 2013", assigned by the journal Rendiconti di Matematica, for his PhD thesis. Post-doctoral research at RICAM, Austria.

2005-2009 Waël Youssef « Contrôle et stabilisation de systèmes élastiques couplés ». Assistant professor at the Lebanese university, co-directed.

2005-2010 Béatrice Chevallier « Analyse de données d'IRM fonctionnelle rénale par quantification vectorielle », co-directed. Assistant professor at Supelec Metz.

1999-2004 Abdelghafour Jabir, « Analyse mathématique des équations de l'électro-diffusion dans un semi-conducteur ».

July 2010- December 2010 Post-doctoral student Lixin Yu. China. Assistant professor. Yantai university.

Advanced courses

April 2014 Course at the CIMPA school on « Contrôle géométrique, stochastique et des équations aux dérivées partielles », April 12—25 2014, Tlemcen, Algeria

March 2013 Course at the Spring school « Analytical and Numerical Aspects of Evolution Equations », March 11—15 2013, Technische Universität, Berlin, Germany

September 2012 Course at the 33rd summer school on Automatic and Control, September 10-14 2012, Gipsa-Lab, Grenoble, France

June 2012 Course at the 8th edition of the « Euro-Maghrebian workshop », June 11-15 2012, Lecce,

June 2011 Course at the University Houari Boumediene (USTHB), Algiers, Algeria

May 2011 Course at the CIMPA school « Contrôle et stabilisation des équations aux dérivées partielles », Monastir, Tunisia

July 2010 Course at the CIME summer school on Control at Cetraro, Italy

Conferences invitations (2010-2015, mainly plenary conferences)

June 2016 International INdAM conference, Optimal Control for Evolutionary PDEs and Related Topics - OCERTO -, June 20-24, 2016, Cortona, Italy

June 2016 Invitation at PICO, June 1-3 2016, Autrans, France

July 2015 SIAM Conference on Control and its Applications, mini-symposium, 8—10 July 2015, Paris

July 2015 Conference « New advances in PDE's, Inverse Problems and Control Theory », 6—10 July 2015, Parma, Italy

March 2015 Colloque « Thématiques théoriques et numériques en contrôle et problèmes inverses pour les EDPs » dans le cadre des trimestres du Laboratoire de Mathématique de Besançon, 2—7 March 2015

September 2014 Conference on « PDE's, Control Theory and Inverse Problems », 15--19 September 2014, Bologna, Italy

August 2014 International Conference on « Control of Self-Organizing Nonlinear Systems », 25 –28 August 2014, Warnemünde-Rostock, Germany

June-July 2014 « First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI », Session on « Control of PDE's, 30 June-4 July 2014, Bilbao, Spain

June 2014, « Sino-french conference on computational and applied mathematics », 2—6 June 2014, Xiamen, China

March-April 2014 « Control of PDE's », 31 March-4 April 2014, Conservatoire National des Arts et Métiers, Paris

December 2013 MCT2013 « Mathematical Control in Trieste », 2—6 December 2013, Trieste, Italy

August-September 2013 Conference « Partial Differential Equations, Optimal Design and Numerics », V Edition, International Center of Sciences, 25 August-5 September 2013, Benasque, Spain

June 2013 « Mathematical Paradigms of Climate Science », 24—28 June 2013, Rome, Italy

June 2013 « Conference Differential Equations, Inverse Problems and Control Theory », 17—21 June 2013,

Cortona, Italy

july 2012 Conference « PDE's, Inverse Problems and Control Theory », 16-20 july 2012, Bologna, Italy

june 2012 Conference « Control of Fluid-Structure Systems and Inverse Problems », 25-28 june 2012, Toulouse

may 2012 « Journées Equations Différentielles en l'honneur de Mohand Moussaoui », 12-14 may 2012, Tipaza, Algeria

january 2012 « Workshop on Control and Inverse Problems on PDE's », CIPPDE-2012, 23–27 january 2012, Santiago de Chile, Chile

Invitations

Fudan university, Shanghai China, Tokyo university Japan, Houari Boumediene university (USTHB) Algeria, three months invitation at the IHP Trimester with a support of the FSMP (Fondation Sciences Mathématiques de Paris), university UNAM Mexico, BCAM, Bilbao Spain, university Santiago de Chile and university La Frontera Temuco Chile, university of Monastir Tunisia, university Tor Vergata Italy, university of Halle, Germany

Participations in PhD and Habilitation jurys (recent ones)

August 2015 Long Hu (Paris 6, PhD referee, Fudan university), november 2014 Yannick Privat (Paris 6, HDR), september 2015 Nicolás Carreno (Paris 6, PhD, referee), november 2013 Thanh Nam Nguyen (Paris-Sud Orsay, PhD), november 2013 Guillaume Olive (Aix Marseille univ., PhD, referee), july 2012 Peipei Shang (Paris 6, PhD), june 2012 Jacques Tort (Univ. Paul Sabatier Toulouse, PhD, referee), december 2011 Vincent Perrollaz (Paris 6, PhD), june 2010 Thierry Horsin (Univ de Versailles, HDR)

Review of research papers

ARMA, JMPA, JDE, JFA, CPDE, MCRF, MCSS, JMAA, JMP, JEE, AMO, SICON, ZAMP, Automatica, COCV, MCIS, Int. J. on Control, M3AS, Nonlinear Anal, CPAA, JDCS, AIHP, ADE, NoDEA, SCL, TAMS,...

Teaching experience

Research master level : courses on Control of PDE's, Semigroups, Nonlinear analysis of PDE's, Optimal control. First year of Master on Introduction to PDE's, Dynamical systems and control, Optimization, Approximation of PDE's, Functional analysis, PDE's course (variational theory)

Licence courses on : Topology and Hilbert spaces, differential calculus, ordinary differential equations, Fourier series, numerical analysis, vectorial spaces level 1, analysis level 1 and 2

Publications list

Book chapters or review articles

[1] F. Alabau-Boussouira, On some recent advances on stabilization for hyperbolic equations. Lecture Note in Mathematics/C.I.M.E. Foundation Subseries Control of Partial Differential Equations, Springer Verlag, volume 2048, 101 pages (2012). Chapitre d'ouvrage.

[2] F. Alabau-Boussouira, P. Cannarsa, Control of partial differential equations. Springer Encyclopedia of Complexity and Systems Science. Springer New-York, 1485–1509 (2009).

Journal articles

- [3] F. Alabau-Boussouira, V. Perrollaz, L. Rosier Finite-time stabilization of a network of strings. *Accepté pour publication à Mathematical Control and Related Fields* (2015). arXiv:1410.1122
- [4] F. Alabau-Boussouira, On the influence of the coupling on the dynamics of single-observed cascade systems of pde's. *Mathematical Control and Related Fields*, 5, 1—30 (2015).
- [5] F. Alabau-Boussouira, A hierarchic multi-level energy method for the control of bi-diagonal and mixed n -coupled cascade systems of PDE's by a reduced number of controls. *Advances in Differential Equations*, 18, 1005—1072 (2013).
- [6] F. Alabau-Boussouira, Insensitizing exact controls for the scalar wave equation and exact controllability of 2 -coupled cascade systems of PDE's by a single control. *Mathematics of Control, Signals, and Systems*, 26, 1—46 (2014). Publié en ligne (mai 2013).
- [7] F. Alabau-Boussouira, P. Cannarsa, A constructive proof of Gibson's stability theorem. *Discret and Continuous Dynamical Systems S* 6, 611-617 (2013).
- [8] F. Alabau-Boussouira, Matthieu Léautaud, Indirect controllability of locally coupled wave-type systems and applications. *Journal de Mathématiques Pures et Appliquées* 99, pp. 544--576 (2013).
- [9] F. Alabau-Boussouira, Controllability of cascade coupled systems of multi-dimensional evolution PDEs by a reduced number of controls. *Comptes Rendus Mathématique Sér. I* 350, pp. 577—582 (2012).
- [10] F. Alabau-Boussouira, P. Cannarsa, R. Guglielmi, Indirect stabilization of weakly coupled systems with hybrid boundary conditions. *Mathematical Control and Related Fields* 1, pp. 413—436 (2011).
- [11] F. Alabau-Boussouira, Matthieu Léautaud, Indirect stabilization of locally coupled wave- type systems. *ESAIM COCV* 18, pp. 548—582 (2012).
- [12] F. Alabau-Boussouira, Strong lower energy estimates for nonlinearly damped Timoshenko beams and Petrowsky equations. *Nonlinear Differential Equations and Applications* 18, pp. 571—597 (2011).
- [13] F. Alabau-Boussouira, Matthieu Léautaud, Indirect controllability of locally coupled systems under geometric conditions. *Comptes Rendus Mathématique Sér. I* 349, pp. 395—400 (2011).
- [14] F. Alabau-Boussouira, K. Ammari, Sharp energy estimates for nonlinearly locally damped PDE's via observability for the associated undamped system. *J. of Functional Analysis* 260, pp. 2424—2450 (2011).
- [15] F. Alabau-Boussouira, J. E. Muñoz Rivera, D. S. Almeida Junior, Stability to weak dissipative systems. *J. of Mathematical Analysis and Applications* 374, pp. 481—498 (2011).
- [16] F. Alabau-Boussouira, New trends towards lower energy estimates and optimality for nonlinearly damped vibrating systems. *J. of Differential Equations* 249, pp. 1145—1178 (2010).
- [17] F. Alabau-Boussouira, A unified approach via convexity for optimal energy decay rates of finite and infinite dimensional vibrating damped systems with applications to semi-discretized vibrating damped systems. *J. of Differential Equations* 248, pp. pp. 1473—1517 (2010).
- [18] F. Alabau-Boussouira, K. Ammari, Nonlinear stabilization of abstract systems via a linear observability inequality and application to vibrating PDE's. *Comptes Rendus Mathématique* 348, pp. 165-170 (2010).
- [19] F. Alabau-Boussouira, P. Cannarsa, A new method for proving sharp energy decay rates for memory-dissipative evolution equations for a quasi-optimal class of kernels. *C. R. Acad. Sci. Paris, Sér. I* 347, pp. 867—872 (2009).
- [20] F. Alabau-Boussouira, J. Prüss and R. Zacher, Exponential and polynomial stability of a wave equation for boundary memory damping with singular kernels. *Comptes Rendus Mathématique, C. R. Acad. Sci. Paris, Sér. I* 347, pp. 277—282 (2009).
- [21] F. Alabau-Boussouira, Asymptotic stability of wave equations with memory and frictional boundary dampings. *Applicationes Mathematicae* 35, pp. 247—258 (2008).
- [22] F. Alabau-Boussouira, P. Cannarsa and D. Sforza, Decay estimates for second order evolution equations with memory. *J. of Functional Analysis* 254, no 5, pp. 1342—1372 (2008).
- [23] F. Alabau-Boussouira, Asymptotic behavior for Timoshenko beams subject to a single nonlinear feedback control. *NoDEA* 14, no. 5-6, pp. 643—669 (2007).
- [24] F. Alabau-Boussouira, P. Cannarsa, G. Fragnelli, Carleman estimates for degenerate parabolic operators with applications to null controllability. *J. Evol. Equ.* 6, no. 2, pp. 161—204 (2006).
- [25] F. Alabau-Boussouira, Piecewise multiplier method and nonlinear integral inequalities for Petrowsky

equations with nonlinear dissipation. *J. Evol. Equ.* 6, no. 1, pp. 95–112 (2006).

[26] F. Alabau-Boussouira, Convexity and weighted integral inequalities for energy decay rates of nonlinear dissipative hyperbolic systems. *Appl. Math. and Optimization*, 51, no. 1, pp. 61–105 (2005).

[27] F. Alabau-Boussouira, Une formule générale pour le taux de décroissance des systèmes dissipatifs non linéaires. *C. R. Acad. Sci. Paris Sér. I Math.*, 338, pp. 35–40 (2004).

[28] F. Alabau-Boussouira, A two-level energy method for indirect boundary observability and controllability of weakly coupled hyperbolic systems. *Siam J. on Control and Optimization*, 42, no. 3, pp. 871–906 (2003).

[29] F. Alabau, Indirect boundary stabilization of weakly coupled systems. *Siam J. on Control and Optimization*, 41, no. 2, pp. 511–541 (2002).

[30] F. Alabau, P. Cannarsa, V. Komornik, Indirect internal damping of coupled systems. *J. of Evolution Equations*, 2, pp. 127–150 (2002).

[31] F. Alabau, Observabilité et contrôlabilité frontière indirecte de deux équations des ondes couplées. *C. R. Acad. Sci. Paris Sér. I Math.*, 333, pp. 645–650 (2001).

[32] F. Alabau, Stabilisation frontière indirecte de systèmes faiblement couplés. *C. R. Acad. Sci. Paris Sér. I Math.*, 328, pp. 1015–1020 (1999).

[33] F. Alabau, A. Jabir., M. Moussaoui, An asymptotic analysis of a unipolar junction model. *Applicable Analysis*, 72, pp. 127–153 (1999).

[34] F. Alabau, V. Komornik, Boundary observability, controllability and stabilization of linear elastodynamic systems. *Siam J. on Control and Optimization*, 37, no. 2, pp. 521–542 (1998).

[35] F. Alabau, On the existence of multiple steady-state solutions in the theory of electrodiffusion. Part I: the nonelectroneutral case. Part II: a constructive method for the electroneutral case. *Trans. of the A.M.S.*, 350, no. 12, pp. 4709–4756 (1998).

[36] F. Alabau, K. Hamdache, Y. J. Peng, Analyse asymptotique du système de Vlasov- Poisson instationnaire dans le cas d'une diode plane. *Asymptotic Analysis*, 16, no. 1, pp. 25–48 (1998).

[37] F. Alabau, M. Moussaoui, Asymptotic estimates for the multi-dimensional electro-diffusion equations. *Math. Models Methods Appl. Sci.* 8, no. 3, pp. 469–484 (1998).

[38] F. Alabau, V. Komornik, Observabilité, contrôlabilité et stabilisation frontière du système d'élasticité linéaire. *C. R. Acad. Sci. Paris Sér. I Math.*, 324, pp. 519–524 (1997).

[39] F. Alabau, Uniqueness results for the steady-state electrodiffusion equations in case of monotonic potentials and multiple junctions. *Nonlinear Anal.* 29, no. 8, pp. 849–887 (1997).

[40] F. Alabau, Structural properties of the one dimensional drift-diffusion models for semi- conductors. *Trans. of the A. M. S.*, 348, pp. 823–871 (1996).

[41] F. Alabau, New uniqueness theorems for the one dimensional drift-diffusion semiconductor device equations. *Siam J. on Math. Anal.*, 26, pp. 715–737 (1995).

[42] F. Alabau, A uniqueness theorem for reverse biased diodes. *Applicable Anal.*, 52, pp. 261–276 (1994).

[43] F. Alabau, M. Moussaoui, Analyse par perturbations singulières de semi-conducteurs multi-dimensionnels. *C. R. Acad. Sci. Paris Sér. I Math.*, 319, pp. 345–349 (1994).

[44] F. Alabau, Étude des modèles de dérive-diffusion à courant donné et à potentiel donné dans le cas de semi-conducteurs mono-dimensionnels. *C. R. Acad. Sci. Paris Sér. I Math.*, 316, pp. 885–890 (1993).

[45] F. Alabau, Comportement de la courbe caractéristique potentiel appliqué-courant d'une diode en polarisation inverse et directe. *C. R. Acad. Sci. Paris Sér. I Math.*, 314, pp. 881–886 (1992).

[46] F. Alabau, A. Lunardi, Behaviour near the travelling wave solution of a free boundary system in combustion theory. *Dynamic Systems and Applications*, 1, pp. 391–418 (1992).

[47] F. Alabau, A method for proving uniqueness theorems for the stationary semiconductor device and electrochemistry equations. *Nonlinear Anal.*, 18, pp. 861–872 (1992).

[48] F. Alabau, Résultats d'unicité pour une classe d'équations stationnaires en physique des semi-conducteurs et des membranes biologiques. *C. R. Acad. Sci. Paris Sér. I Math.*, 311, pp. 589–592 (1990).

[49] F. Alabau, Uniform asymptotic error estimates for semiconductor device and electro- chemistry equations. *Nonlinear Anal.*, 14, pp. 123–139 (1990).

Articles in Conference proceedings

- [50] F. Alabau-Boussouira, Energy decay rates and convexity for hyperbolic equations with nonlinear dissipation. Proceedings of Science. Control Systems: Theory, Numerics and Applications, 30 march-1er april 2005, Rome.
- [51] F. Alabau, Boundary stabilization of weakly coupled hyperbolic systems by one control force. IEEE et CDC02, December 2002, Las Vegas.
- [52] F. Alabau, V. Komornik, Boundary observability and controllability of linear elastodynamic systems. Optimization methods in partial differential equations (South Hadley, MA, 1996), 1–8, Contemp. Math., 209, Amer. Math. Soc., Providence, RI, 1997.
- [53] F. Alabau, Uniqueness problems for drift-diffusion models for semiconductor devices. Research Notes in Math., Pitman, 296 (1993), 121–126.
- [54] F. Alabau, A qualitative analysis of the potential and current driven semiconductor equations. World Congress of Nonlinear Analysts, Tampa (1992).
- [55] F. Alabau, A decoupling method for proving uniqueness theorems for electrodiffusion equations. Research Notes in Math., Pitman, 266 (1992), 107–119.
- [56] F. Alabau, An analysis of the uniqueness of the solutions of the one-dimensional steady- state semiconductor device equations. Proceedings of Equadiff 91. Barcelone (1991).

Submitted articles

- [57] F. Alabau-Boussouira, J.-M. Coron, G. Olive internal controllability of first order quasilinear hyperbolic systems with a reduced number of controls. Preprint Hal hal-01139980 (2015), 26 pages.
- [58] F. Alabau-Boussouira, Z. Wang, L. Yu A one-step optimal energy decay formula for indirectly nonlinearly damped hyperbolic systems coupled by velocities. arXiv :1503.04126 (2015), 32 pages.
- [59] F. Alabau-Boussouira, P. Cannarsa, G. Leugering Control and stabilization of degenerate wave equations. arXiv :1505.05720 (2015), 29 pages.
- [60] F. Alabau-Boussouira, Y. Privat, E. Trélat, Nonlinear damped partial differential equations and their uniform discretizations, 41 pages.