MICHEL LENCZNER

30 October 2017

Personal Information

Date of Birth - 11/03/62
Citizenship - France

Education

HDR, University of Franche-Comté, 2000
Ph.D., Applied Mathematics, Paris 6 University, France, 1991
DEA, Numerical Analysis, Paris 6 University, 1987
Maîtrise, Applied Mathematics, Paris 6 University, 1983

Professional Experience

2009 - Present	Researcher with the Time and Frequency Department at the FEMTO-ST Institute.
2007 (6 months)	Visiting the Department of Applied Mechanics at FEMTO-ST, Besançon (France)
2005 - 2006	One-year visit at the Center for Research of Scientific Computation, North Carolina State University (USA) supported by a CRCT
2001 – 2009	Researcher with the departement of Mechanical Engineering M3M at UTBM
2001 - 2009	Professor in Mechanical Engineering at the Belfort-Montbéliard University of Technology
2000	Habilitation à Diriger des Recherches, « *Contributions à la modélisation et au contrôle de systèmes intelligents distribués.* ». Committee E. Sanchez-Palencia (Director of research at CNRS at Paris 6 and Academy of Science), F. Bourquin (General Engineer of the Laboratoire des Ponts et Chaussées), D. Cioranescu (Director of research at CNRS at Paris 6), M. R. Laydi Associate professor and HDR at University of Franche-Comté, P. Lesaint Professor at University of Franche-Comté, P. Perrier (Head of the R&D at Dassault Aviation, Corresponding member of the Academy of Science)
1992 - 2001	Associate professor with the Departement of Mathematics at the Franche-Comté, University, Besançon
1991 - 1992	Assistant Professor with the Numerical Analysis Laboratory, Paris 6 University
1990 - 1991	Research Engineer with the Oceanographic Laboratory, Paris 6 University
1987-1991	PhD Thesis of the Paris 6 University, prepared at ONERA Chatillon : « *Formulation lagrangienne des équations d'évolution de microfissures et contribution au calcul des coefficients de singularités dans les milieux fissurés 2-d et 3-d* ». Supervision by Ph. Destuynder (Ecole Centrale Paris), in the mechanics laboratory run by J.L. Chaboche and with referees J.J.

Marigo (Engineer at EDF) and P. Grisvard (Head of the Institut Henri Poincaré Paris and University of Nice).

1987	DEA of Numerical Analysis, University of Paris 6
1986	Maîtrise of Mathematical Engineering, University of Paris 6

Short bio

Michel Lenczner is a Professor of Mechanical Engineering at the Technical University of Belfort-Monbéliard, and is a researcher in the Time and Frequency department at the FEMTO-ST Institute. His research focuses on multi-scale modelling and control of distributed mechatronic systems with applications to micro-system arrays. For few years, he contributes to the transverse project "Digital Electronics: FPGA" at FEMTO-ST. His previous position was as an associate professor in applied mathematics at the University of Franche-Comté.

Research Interests

Development of New Mathematical Methods and Software: Multi-scale Modelling, Real-time Distributed Computing and Control. FPGA.
Applications: Distributed Smart Systems and Distributed MEMS/NEMS.

Research Group Direction

1994-2001	Smart Materials and Structures Group at the Laboratory of Mathematics of University of Franche-Comté, Besançon
2002-2009	Distributed Intelligent Systems Group at the Laboratory M3M at UTBM, Belfort
2012 - 2014	Transverse Group for Numerical Electronics and FPGA at the Institute FEMTO-ST
2017 - today	Responsible of the COSYMA team on Micro-acoustics components and systems

Master's Advisor

07/94   Senouci-Bereksi Ghouti, Modelling and numerical simulation of multilayered piezoelectric plates, enrolled in a PhD Program at the Franche-Comté University, France.

07/95   Jerebi Aref, Approximation of functions by the kind of forces generated by piezoelectric patches, enrolled in a PhD program at the Corsica University, France.

07/96   Mahamane Kader, Parameterization of dynamic controllers for the heat equation, enrolled in a PhD program at the Franche-Comté University, France.

09/96   Laurent Willoq, Modelling of distributed controllers using piezo-electric transducers and active component.

07/00   Liliana Cucu, Optimal control for a two-scale model of wave equation, Estimator based on a Proper Orthogonal Decomposition, enrolled in PhD program at the Toulouse University, France.

12/99   Mathieu Luc, A simplified model for the wave equation with oscillating coefficients.

07/00 Gabard Gwanaël, Active control of a plate with a distribution of actuators and acoustic transmission through this plate, enrolled in PhD program at Compiègne University of Technology, France.

10/08 Su Shaopu, A two-dimensional model of coupled nano-resonnators. Six-months project funded by the LETI-CEA and the Carnot Institut, Master Degree from the North Western Polytechnic University in Xi'an China. Enrolled in PhD program at the Nantes Central Engineering School.

03/10 Gwenhaël Goavec-Merou, FPGA Partial Implementation of an Optimal Distributed Control Law for MEMS Arrays. Funded by the PPF-MIDI. Enrolled in Phd program at FEMTO-ST.

Student Teaching Advisor

2007 Pauline Simonet, A numerical scheme for Atomic-Force Microscope Arrays Modelling.
2011 Huu-Tuan Nguyen, Market study for Software dedicated to Design of Arrays of MEMS/NEMS (5 months), Funded by the OSCAR Project in the INTERREG IV Program.

Ph.D. Advisor

09/08/99 Senouci-Bereksi Ghouti, Modelling, homogenization and implementation of a distributed control law for shell vibrations through a spatially distributed electronic circuit. Assistant Professor in Algeria.

06/28/00 Mahamane Kader, Contributions to Control of Distributed Smart Structures. Consultant in Scientific Computing.

07/15/10 Youssef Yakoubi, Two approximation methods for decentralized optimal control of distributed systems, 2005/10-2010/07

05/06/13 Hui Hui, Contribution to a Simulator of Arrays of Atomic Force Microscopes, Grant of the Chinese Government, 2008/10-2011/09. Research engineer in Beijing

26/11/14 Gwenhaël Goavec-Merou, Coprocessor Generator for Data Processing of Video or Similar Fluxes, CIFRE Contract, 2010/05-2014/11. Research Engìneer at FEMTO-ST.

03/12/14 Trang Thi Nguyen, A two-scale model for wave propagation in a bounded domain with periodic physical properties, Grant of the French Ministry of Education and Research, 2010/09-2014/12/03. Research Engineer at FEMTO-ST.

16/12/14 Bin Yang, Contribution to a kernel of a software for multiscale and multiphysic modelling: geometric aspects, Grant of the Chinese Government, Project NANOHEAT, 2009/10-2014/12/16. Research Engineer at FEMTO-ST. Research Engineer at the University of Brussels.

17/12/2015 Homam ISSA, Contributions to Configurable Product Design in Advanced CAD Systems, 2011/09-2015/12. Grant of the Syrian Government.

16/02/2016   Quan DO HUU, Analysis and optimization of the diffusive representation method for distributed control applications with distributed computing, 2012/09-2016/01. Co-supervision with Raphaël Couturier. Grant of the LABEX ACTION.

10/03/2017   Duc NGUYEN DUY, A software package for multi-scale modeling and design of arrays of micro and nano-systems with application to an array of micro-mirrors, 2013/09-. Grant of the Regional Council of Franche-Comté.

Present   Ke DU, Building and analyzing processing chains on FPGAs with strong time and hardware constraints, 2014/10-. Grant of the Chinese Government.

Present   Nguyen Nhat Binh TRINH, A new family of multi-physics and multi-scale models of micro-mirror arrays, 2016/12-. Grant of the Regional Council of Franche-Comté.

Post-Doc Advisor

1998   Michel Calin, Realization and test of an experimental set up for distributed control. TechnoFirst and ADED.

1999   Mohamed Laghsal, Numerical simulation of thin structures including piezoelectric transducers and a spatially distributed electronic circuit.

1999   Mohamed Ould Salihi, Implementation of a numerical method based on the Proper Orthogonal Decomposition for a convection-diffusion equation and for a one dimensional two-scale model of the wave equation with variable coefficients.

2005   Marius Gerghu, Two-scale models for n-dimensional wave equation with oscillating coefficients.

2010   Youssef Yakoubi, Modelling and Control of an AFM Array, Funded by the OSCAR Project in the INTERREG IV Program (20 months).

2011   Youssef Yakoubi, Diffusive realization for distributed control, ATER (24 months).

2011   Walid Belkhir, Rewriting techniques for two-scale model proof derivation, Funded by the OSCAR Project in the INTERREG IV Program and the PPF-MIDI Program (12 months).

2013   Vincent Chalvet, Real-time control of the NANOHEAT thermal probe (12 months) in the NANOHEAT project.

2014   Mohamed Abaidi, A time two-scale model of the AFM-Th probe (10 months) in the NANOHEAT project.

2014   Walid Belkhir, Extension-Composition method based on rewriting strategies for multiscale model derivations. 12 months funded by the NANOHEAT project.

Advisor of Engineer

2010   Alois Dreyfus, Software Engineering for the AFMALab Software, Funded by the OSCAR Project in the INTERREG IV Program.

Ph.D. Referee

11/2002   Virginie Régnier, Distribution of the energy flow of dispersive and non dispersive waves in one-dimensional and two-dimensional elementary or locally elementary ramified spaces.

12/2005   Samir Akrout, Deterministic dynamical behavior of broad band guided structures.

12/2009   Céline Cazenave, *Représentation diffusive et inversion opératorielle pour l'analyse et la résolution de problèmes dynamiques non locaux,* Automatics and Systems, Toulouse, 09/12/2009.

11/2009   Chady Kharrat, *Applications des techniques de contrôle sur les réseaux de micro et nanostructures,* Automatics and Productics, Grenoble, 10/12/2009.

HDR Referee

23/02/2010   Eric Colinet, *Des architectures MEMS aux architectures NEMS*, Grenoble
2016   Referee of two HDR for the Scientific Council of the Bourgogne-Franche-Comté University

Chapters in Books (Invited)

Senouci, G. and Lenczner, M. Modelling of a thin piezoelectric shell coupled with a distributed electronic circuit by distributed piezoelectric transducers. Chapter of the book : Partial differential equations on multistructures. Edited by Felix Mehmeti, Joachim Von Below and Serge Nicaise. Lecture notes in Pure and Applied Mathematics, pp 227-248, (2001).

Lenczner M., Microsystèmes actifs distribués, Chapter IX of « ARAGO 21 : Microsystèmes », Ed. Observatoire Français des Techniques Avancées, (1999).

Lenczner M., Ratier N., Pillet E., Cogan S., Hui H. Modelling, Identification and Control of a Micro-cantilever Array, Micro, NanoSystems & Systems on Chips, Modeling, Control and Estimation, Edited by Alina Voda, John Wiley & Sons, (2010).

Papers (Refereed Journals)

1. Lenczner M. Une Méthode de calcul du coefficient de singularité pour la solution du problème de Laplace dans un domaine diédral, *Modélisation Math. Anal. Numér.*, n° 4, pp 395-420, (1993).

2. Lenczner M., Caractérisation des fonctions singulières duales, et calcul du coefficient de singularité de la solution de l'équation de Laplace 3-D dans un domaine fissuré. *C. R. Acad. Sci. Paris,* t. 314, Série I, pp. 265-270, (1992).

3. Laydi R. et Lenczner M. Equation de Navier-Stokes dans un domaine mince avec viscosité évanescente. *C. R. Acad. Sci. Paris,* t. 326, Série I, pp. 127-130, (1997).

4. Benabdallah A. et Lenczner M. Stabilisation de l'équation des ondes par un contrôle optimal distribué, *C. R. Acad. Sci. Paris*, t. 319, Série I, pp. 691-696, (1994).

5. Benabdallah A. et Lenczner M. Une méthode d'estimation du taux de décroissance pour des problèmes de stabilisation, application au contrôle optimal de l'équation des ondes par un contrôle de Dirichlet. *C. R. Acad. Sci. Paris*, t. 321, Série I, pp. 875-878, (1995).

6. Benabdallah A. et Lenczner M. Estimation du taux de décroissance pour la solution de problèmes de stabilisation, application à la stabilisation de l'équation des ondes. *Mathematical Modelling and Numerical Analysis*, vol. 30, n 5, pp. 607-635, (1996).

7. Lenczner M. Modelling and optimization of a plate including a distribution of piezoelectric transducers and an electronic network. *Journal of Structural Control,* vol. 3, n° 1-2, pp. 53-77, (1996).

8. Lenczner M. Homogénéisation d'un circuit électrique. *C. R. Acad. Sci. Paris, Série II b*, t. 324, n° 9, pp. 537-542, (1997).

9. Canon E. et Lenczner M. Models of elastic plates with piezoelectric inclusions, Part 1 Models without homogenization, *Mathernatical and Computer Modeling*, vol. 26, 5, pp. 79-106, (1997).

10. Canon E. et Lenczner M. Deux modèles de plaques minces avec inclusions piézoélectriques et circuits électroniques distribués, *C.R. Acad. Sci. Paris Série II b*, t. 326, pp 793-798, (1998).

11. Mahamane K. et Lenczner M. Paramétrisation de stabilisateurs H-infini sous optimaux. Application à l'équation des ondes, *C. R. Acad. Sci. Paris, Série I,* t. 327, pp 179-183, (1998).

12. Lenczner M. et Senouci-Bereksi G. Homogenization of electrical network including voltage to voltage amplifiers. *Mathematical Models and Methods in Applied Sciences*, Vol. 9, n° 6, pp 899-932, (1999).

13. Lenczner M. Microsystèmes actifs distribués, Chapitre IX de l'ouvrage collectif « ARAGO 21 : Microsystèmes », Ed. Observatoire Français des Techniques Avancées, (1999).

14. Canon E. et Lenczner M. Modelling of thin elastic plates with small piezoelectric inclusions and distributed electronic circuits. Models for inclusions that are small with respect to the thickness of the plate. *Journal of Elasticity* n°55, p. 111-141 (1999).

15. Mahamane K., Lenczner M. et Mrcarica Z. Approximation d'un contrôle optimal distribué par un circuit électronique réparti : Application au contrôle de vibrations. *C.R. Acad. Sci. Paris, Série II b*, t. 328, n° 7, p. 547-553, (2000).

16. Lenczner M., Kader M., Perrier P., Modélisation à deux échelles de l'équation des ondes à coefficients oscillants, *C.R. Acad. Sci. Paris, Série II b*, v 328, n°4, p 335-40 (2000).

17. Kader M., Lenczner M. and Mrcarica Z. Distributed control based on distributed electronic circuits. Application to vibration control, *Journal of Microelectronic Reliability*, 41, p. 1857-1866 (2001).

18. Lenczner M. et G. Senouci, Modelling of a thin piezoelectric shell coupled with a distributed electronic circuit by distributed piezoelectric transducers, Partial Differential Equations on Multistructures, Luminy, 19-23 Avril 1999. Edited by F. Ali Mehmeti, J. von Below et S. Nicaise, *Lecture notes in pure and applied mathematics,* vol. 219, pp. 227-248 (2001).

19. Kader M., Lenczner M. and Mrcarica Z., Distributed optimal control of vibrations : A high frequency approximation approach. *Smart Materials and Structures*, Vol 12, n°3, pp 437-446 (2003).

20. Lenczner M., Mercier D., Homogenization of periodic electrical network including voltage to current amplifiers, *SIAM Journal of Multiscale Modelling and Simulation*, vol. 2, n°3, pp. 359 –397, (2004).

21. Lenczner M., Montseny G., Diffusive realization of operator solutions of certain operational partial differential equations, *C. R. Mathématique de l'Acad. des Sci.*, vol. 341, n°12, pp. 737-740, (2005).

22. Lenczner M. Homogenization of linear spatially periodic electronic circuits, *Networks and Heterogeneous Media*, vol. 1, n° 3, pp. 467-494, (2006).

23. M. Lenczner, and C. Prieur, [Asymptotic model of an active mirror,](#) Int. J. of Tomography Statistics, vol. 5 (special volume), pp. 68-72, 2007.

24. M. Lenczner, R.C. Smith, A two-scale model for an array of AFM's cantilever in the static case, Mathematical and Computer Modelling, vol. 46, n° 5-6 , pp. 776-805, (2007).

25. M. Lenczner, A Multiscale Model for Atomic Force Microscope Array Mechanical behavior, Applied Physics Letters, vol. 90, pp. 091908, (2007).

26. M. Lenczner, Y. Yakoubi, Semi-decentralized Approximation of Optimal Control for Partial Differential Equations in Bounded Domains. Comptes Rendus Mécanique, vol. 337, Issue 4, pp. 245-250, (2009).

27. M. Lenczner, S. Cogan, E. Pillet, H. Hui, A Multiscale Model of Cantilever Arrays and its Updating, Sensors & Transducers Journal, Vol.7, Special Issue "MEMS: From Micro Devices to Wireless Systems", October 2009, pp. 125-135.

28. M. Brassart, M. Lenczner, A two-scale model for the wave equation with oscillating coefficients and data. Comptes Rendus Mathématiques, vol. 347, n° 23-24, pp. 1439-1442, 2009.

29. M. Brassart, M. Lenczner, A two-scale model for the periodic homogenization of the wave equation, J. Math. Pures Appl. 93 (2010) 474–517.

30. M. Lenczner, G. Montseny, Y. Yakoubi, Diffusive Realizations for Solutions of Some Operator Equations : the One-Dimensional Case. Mathematics of Computation, vol. 81, n° 277, pp. 319–344, 2012.

31. H. Hui, E. Pillet, M. Lenczner, S. Cogan, A two-scale model for one-dimensional arrays of cantilevers, its updating and parameter identification. Mechatronics, vol. 22, n° 5, 2012, pp. 538–543.

32. W. Belkhir, A. Giorgetti, M. Lenczner, A symbolic transformation language and its application to a multiscale method. Journal of Symbolic Computation 65, 49–78 (2014) and arXiv:1311.0904.

33. E. Canon, M. Lenczner, Modelling of thin isotropic elastic plates with small piezoelectric inclusions and distributed electric circuits. Models for inclusions larger or comparable to the thickness of the plate. To appear in Mathematical Models and Methods in Applied Sciences (2014).

34. G. Goavec-Merou, N. Chretien, J.-M. Friedt, P. Sandoz, G. Martin, M. Lenczner, and S. Ballandras Fast contactless vibrating structure characterization using real time FPGA-based digital signal

processing: demonstrations with a passive wireless acoustic delay line probe and vision. Review of Scientific Instruments 85, 015109 (2014).

35. Youssef Yakoubi, Michel Lenczner and Nicolas Ratier, Semi-decentralized approximation of optimal control for partial differential equations in bounded domains. arXiv:1310.7100 (2013). Optimal Control, Applications and Methods Volume 36, Issue 4, Pages 422–446 (2015).

36. Bin Yang, Walid Belkhir, Michel Lenczner, Computer-Aided Derivation of Multi-scale Models: A Rewriting Framework, arXiv:1302.2224 (2013). International Journal for Multiscale Computational Engineering. 12 (2): 91–114 (2014).

37. T.T. Nguyen, M. Lenczner, M. Brassart, Homogenization of the spectral equation in one-dimension, arXiv:1310.4064 (2013). International Journal for Multiscale Computational Engineering, vol 12, 5, pp.423-450, (2014).

38. H. Issa, E. Ostrosi, M. Lenczner, R. Habib. Fuzzy holons for intelligent multi-scale design in cloud-based design for configurations. Journal of Intelligent Manufacturing. DOI 10.1007/s10845-015-1119-4, (2015).

39. F. Vernotte, M. Lenczner, P.-Y. Bourgeois, E. Rubiola. The Parabolic variance (PVAR), a wavelet variance based on least-square fit, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control. Volume: 63, Issue: 4, 2016.

40. E. Rubiola, M. Lenczner, P.-Y. Bourgeois, F. Vernotte. The Omega counter, a frequency counter based on the Linear Regression. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control. Volume: 63, Issue: 7, 2016.

41. Lenczner, M., Yang, B., Bontempi, A., Teyssieux, D., Cogan, S., Janus, P., Köhler B., Ratier, N. A SThM probe optimization and its time-space multi-scale modeling. Mechatronics Volume 40, December 2016, Pages 251–263 (2016).

Papers (submitted)

42. M. Lenczner, H. Hui, S. Su, A Model for Two-Dimensional Arrays of AFM Cantilevers in the Dynamic Regime, Submitted.M. Lenczner, S. Su and H. Hui. A Model of Two-dimensional Array of Cantilevers and its Validation, Submitted.

Papers (Refereed Proceedings)

1. **Lenczner M**. and <u>Senouci Berecksi G</u>., "Homogenization of electrical circuit including voltage to voltage amplifiers ". Japan France Serninar on Intelligent Materials and Structures, 27 28 octobre 1997 Sendai (Japon).

2. **Lenczner M**. and <u>Senouci Berecksi G</u>. "Homogenization of electrical circuit including voltage to voltage amplifiers ". ICAST'97, 28 30 octobre 1997, Wakayama (Japon).

3. Mrcarica Z., Risojevic V., **Lenczner M**., Jakovljevic M., Litovski V., Integrated simulator for MEMS using FEM implementation in AHDL and frontal solver for large sparse systems of equations. 1998.

4. Senouci-Bereksi G., **Lenczner M.**, Homogenization of an active distributed electronical network coupled with a continuous medium. SPIE's 6th Annual International Symposium on Smart Structures and Materials, 1-5 March 1999, Newport Beach (USA)

5. Senouci-Bereksi G., **Lenczner M.**, Implemenation of distributed control law for thin shell vibrations by a distributed electronic circuit. SPIE's 6th Annual International Symposium on Smart Structures and Materials, 1-5 March 1999, Newport Beach (USA)

6. Kader M., **Lenczner M.**, Approximation of distributed control law using distributed electronic devices for vibration control, SPIE's 6th Annual International Symposium on Smart Structures and Materials, 1-5 March 1999, Newport Beach (USA)

7. **Lenczner M**. et G. Senouci, Modelling of a thin piezoelectric shell coupled with a distributed electronic circuit by distributed piezoelectric transducers, Partial Differential Equations on Multistructures, Luminy, 19-23 Avril 1999. Edited by F. Ali Mehmeti, J. von Below et S. Nicaise, Lecture notes in pure and applied mathematics, vol. 219, pp. 227-248 (2001).

8. **Lenczner M.**, Mathieu L., Kader M., Two-scale model for the wave equation with oscillating coefficient, XVième Congrès Français de Mécanique, Nancy 3-7 septembre 2001.

9. M. Brassart, **Lenczner M**, M. Gerghu, A two-scale model for the wave equations with periodic coefficients, II ECCOMAS Thematic Conference, 18-21 July 2005, Lisbonne, Portugal.

10. **Lenczner M**, G. Montseny, Y. Yakoubi, CFM, Congrès Français de Mécanique, 29 août – 2 septembre 2005, Troyes, France.

11. **Lenczner M**, G. Montseny, Y. Yakoubi, Approximation of distributed control operators on quasi-local architectures, IMACS 2005, 11-15 july Paris, France.

12. **Lenczner M**, C. Prieur, Asymptotic model of an active mirror, Proceedings of the 13th IFAC Workshop on Control Applications of Optimisation, 26 - 28 April 2006, Paris - Cachan, France.

13. S. Ballandras, **Lenczner M**, T. Larroche, Treatment of the asymptotic behaviour of the piezoelectric Green's function for finite element boundary element analysis of surface waveguides. J Acoust Soc Am. 2008 May ;123 (5):3292

14. **Lenczner M**, Y. Yakoubi, Semi-Decentralized Approximation of an Optimal Control applied to a Cantilever Array. IFAC CAO´09 Workshop in Jyväskylä, Finland, May 6-8, 2009.

15. **Lenczner M**, S. Cogan, E. Pillet, H. Hui, A Multiscale Model of Micro Cantilever Arrays. EuroSimE 2009 in Delft, The Netherlands, April 27-28-29, 2009.

16. N. Ratier, **Lenczner M**, Simulation of large-scale periodic circuits by a homogenization method. EuroSimE 2009 in Delft, The Netherlands, April 27-28-29, 2009.

17. **Lenczner M**, E. Pillet, S. Cogan, H. Hui, A Multiscale Model of Micro Cantilever Arrays. Nanotech Conference & Expo 2009, Technical Proceedings, vol. 3, pp. 320-323, 2009.

18. W. Daniau, **Lenczner M**, T. Laroche, J. Garcia, On the Convergence of 2D and 3D Finite Element/Boundary Element Analysis for Periodic Acoustic Waveguides, IEEE Frequency Control Symposium & European Frequency and Time Forum, 21-24 April 2009, Besançon, France.

19. **Lenczner M**, E. Pillet, S. Cogan, <u>H. Hui</u>, N. Ratier A Multiscale Model of Micro Cantilever Arrays and its Validation. 20th workshop on micromachining, micro mechanics and micro systems, 20-22 September 2009, Toulouse, France.

20. **Lenczner M**, Shaopu SU and <u>Hui HUI</u>. A Model of two-dimensional Array of Cantilevers and its validation. dMEMS 2010, Besançon, France - June 28-29th 2010

21. Gwenhael Goavec-merou, Youssef Yakoubi, Raphaël Couturier, **Lenczner M** and Jean-Michel Friedt. FPGA Implementation of Diffusive Realization for a Distributed Control Operator. dMEMS 2010, Besançon, France - June 28-29th 2010.

22. <u>Hui HUI</u>, Youssef YAKOUBI, **Lenczner M** and Nicolas RATIER. A multiscale model of cantilever arrays with a semi-decentralized approximation of an optimal control. dMEMS 2010, Besançon, France - June 28-29th 2010.

23. <u>H. Hui</u>, <u>Y. Yakoubi</u>, **Lenczner M**, and N. Ratier. Control of a Cantilever Array by Periodic Networks of Resistances. EurosimE, Bordeaux, France - April 26-28th 2010.

24. M. Brassart and **Lenczner M**. Homogenization of wave equation based on the wave two-scale transform, IV European Conference on Computational Mechanics, ECCM 2010, Paris, France - May 16-21, 2010.

25. <u>H. Hui</u>, <u>Y. Yakoubi</u>, **Lenczner M**, and N. Ratier. Semi-decentralized approximation of a LQR-based controller for a one-dimensional cantilever array. 18th World Congress of the International Federation of Automatic Control (IFAC), August 28 – September 2 2011, Milano, Italy.

26. <u>Y. Yakoubi</u>, **Lenczner M**, G. Goavec-Merou, R. Couturier, J.M. Friedt. Diffusive Realization of a Lyapunov Equation Solution, and its FPGA Implementation. 18th World Congress of the International Federation of Automatic Control (IFAC), August 28th – September 2nd 2011, Milano, Italy.

27. <u>H. Hui</u>, <u>Y. Yakoubi</u>, **Lenczner M**, and S. Cogan. Modeling, Filtering, Control, and Optimization for AFM Arrays. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 18th – 20th, 2011, Linz, Austria.

28. <u>B. Yang</u>, W. Belkhir, **Lenczner M** and A. Giorgetti. Computer–Assisted Multiscale Model Derivation for MEMS Arrays. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 18th – 20th, 2011, Linz, Austria.

29. R. N. Dhara, <u>B. Yang</u>, W. Belkhir, **Lenczner M**, A. Giorgetti. Formal Methods for Multiscale Models Derivation. 20ème Congrès Français de Mécanique, August 28th – September 2nd, 2011, Besançon, France.

30. <u>H. Hui</u>, <u>Y. Yakoubi</u>, **Lenczner M**, S. Cogan, A. Meister, M. Favre, R. Couturier and S. Domas. Modeling, Filtering, Control, and Optimization for AFM Arrays. 20ème Congrès Français de Mécanique, August 28th – September 2nd, 2011, Besançon, France.

31. M. Brassart, **Lenczner M**, T. T. Nguyen. Homogenization of the wave equation in periodic structure. 20ème Congrès Français de Mécanique, August 28th – September 2nd, 2011, Besançon, France.

32. <u>B. Yang</u>, R.N. Dhara, **Lenczner M**, W. Belkhir, A. Giorgetti. Symbolic Transformations for Two-Scale Methods: Application to Combined Thin and Periodic Regions, DMEMS 2012, April 2-3 2012, Besançon, France.

33. R. Couturier, S. Domas, <u>G. Goavec-Merou</u>, M. Favre, **Lenczner M** and A. Meister. A new approach based on a least square method for real-time estimation of cantilever array deflections with a FPGA, DMEMS 2012, April 2-3 2012, Besançon, France.

34. <u>H. Hui</u>, <u>Y. Yakoubi</u>, **Lenczner M**, S. Cogan , A. Meister, M. Favre, R. Couturier, S. Domas. Modeling, Filtering and Optimization for AFM Arrays, DMEMS 2012, April 2-3 2012, Besançon, France.

35. E. Ostrosi, **Lenczner M**. International Conference on Engineering Materials (ICEM 2012), December 30-31, 2012, Singapore.

36. <u>H. Issa</u>, E. Ostrosi, **Lenczner M**, R. Habib, Fuzzy Functional Modelling in CAD Systems. Concurrent Engineering Approaches for Sustainable Product Development in a Multi-Disciplinary Environment, Proceedings of the 19th ISPE International Conference on Concurrent Engineering, pp 595-608, 2013. Print ISBN 978-1-4471-4425-0.

37. R. Couturier, S. Domas, <u>G. Goavec-Merou</u>, M. Favre, **Lenczner M** and A. Meister. A cost effective AFM setup, combining interferometry and FPGA. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 15-17, 2013 Wroclaw, Poland. ISBN: 978-1-4673-6139-2.

38. <u>B. Yang</u>, W. Belkhir, **Lenczner M** and N. Ratier. A Multiscale Model Derivation and Simulation Tool for MEMS Arrays. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 15-17, 2013 Wroclaw, Poland. Print ISBN: 978-1-4673-6138-5.

39. **Keynote** - <u>H. Hui</u>, **Lenczner M**, S. Cogan, A. Meister, M. Favre, R. Couturier, S. Domas. Estimation of deflections by interferometry in a cantilever array and its optimization based on a two-scale model. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 15-17, 2013 Wroclaw, Poland. Print ISBN: 978-1-4673-6138-5

40. <u>B. Yang</u>, **Lenczner M**, S. Cogan, B. Gotsmann, P. Janus and G. Boetch, Modelling, simulation and optimization for a SThm nanoprobe, EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 7-9, 2014, Ghent, Belgium. Electronic ISBN: 978-1-4799-4790-4.

41. **Keynote** - **Lenczner M**, <u>Bin Yang</u>, Mohamed Abaidi, Alexia Bontempi, Damien Teyssieux, Bernd Koehler, Pawel Janus, Modeling and model-based control of temperature in an SThM probe. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems, Budapest, Hungria; 04/2015. Electronic ISBN: 978-1-4799-9950-7.

42. **Keynote** - <u>Duy Duc Nguyen</u>, Walid Belkhir, Nicolas Ratier, Bin Yang, **Lenczner M**, Frédéric Zamkotsian, Horatiu Cirstea, A multi-scale model of a Micro-Mirror Array and an automatic model derivation tool. EuroSimE IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems, Budapest, Hungria; 04/2015. Electronic ISBN: 978-1-4799-9950-7.

43. F Vernotte, **Lenczner M**, P.-Y Bourgeois, E Rubiola, Least-Square Fit, Ω Counters, and Quadratic Variance. Joint Conference of the IEEE International Frequency Control

Symposium & European Frequency and Time Forum, Denver, Colorado, USA; 04/2015. Electronic ISBN: 978-1-4799-8866-2.

44. <u>Nguyen, T. T</u>., **Lenczner M**., & Brassart, M. Homogenization of the one-dimensional wave equation. In Numerical Mathematics and Advanced Applications-ENUMATH 2013 (pp. 377-385). Springer International Publishing (2015). Print ISBN 978-3-319-10704-2.

45. Walid Belkhir, Nicolas Ratier, <u>Duy Duc Nguyen</u>, <u>Bin Yang</u>, **Lenczner M**, Frédéric Zamkotsian, Horatiu Cirstea. Towards an automatic tool for multi-scale model derivation illustrated with a micro-mirror array. SYNASC 2015. 17th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, September 21-24 2015, Timisoara, Romania. Electronic ISBN: 978-1-5090-0461-4.

46. <u>Huu-Quan Do</u>, **Lenczner M**, Raphaël Couturier and <u>Youssef Yakoubi</u>. Diffusive Realization of a Lyapunov Equation Solution and Parallel Algorithms Implementation, SIAM Conference on Control and Its Applications (CT15), July 8-10 2015, Paris. DOI: http://dx.doi.org/10.1137/1.9781611974072.10

47. <u>Ke Du</u> , Stéphane Domas, **Lenczner M**, Guangjin Zhang. An Improved Algorithm Based on SURF for MR Infant Brain Image Registration. Intelligent Computing Theories and Application, 2016. Volume 9772 of the series Lecture Notes in Computer Science pp 458-470. DOI: 10.1007/978-3-319-42294-7_41

48. **Lenczner M**, <u>B. Yang</u>, S. Cogan, S. Domas, D. Ke, R. Couturier, D. Renault, B. Koehler, P. Janus. Temperature control of an SThM micro-probe with an heat source estimator and a lock-in measurement. IEEE Thermal, Mechanical and Multiphysics Simulation and Experiments in Micro/Nanoelectronics and Systems. April 17-20, 2016, Montpellier, France. Electronic ISBN: 978-1-5090-2106-2.

Grants Awarded

1994	Principal Investigator of "Mathematical study of edge and corner singularities in three-dimensional elastic bodies" funded by Electricité De France (EDF), 100 KF.
1997	Principal Investigator with F. Bastien of the Laboratory of Physics and Metrology of Oscillators, TechnoFirst and the Agency for Economical Development of Doubs of "Numerical modelling and prototyping of a system of vibration control through a distribution of piezoelectric actuators", 150 KF.
1998	Principal Investigator of "Support for the research program on Intelligent Distributed Systems" funded by the French Ministry of National Education and Research, 150 KF.
1999	Principal Investigator of the project "Support for the research program on Intelligent Distributed Systems" funded by the Regional Council of Franche-Comté, 280 KF.
1997-2000	Responsible of the control task in the European Project n° BRPR-CT97-0573 « Investigation of the Viability of MEMS Technology for Boundary Layer Control on Aircraft » (AEROMEMS), leaded by C. Warsop, British Aerospace, 300 KF.
2007-2008	Principal Investigator in the exploratory Project (CNRS- PEPS) "Demonstrator for a software dedicated to Atomic Force Microscope Arrays design", 10 K€.
2008	Principal Beneficiary in the project funded by the LETI-CEA and the Carnot Institut, "A two-dimensional model of coupled nano-resonnators", 17 K€.

2009   Principal Investigator in the project "Implementation of an optimal control law for MEMS Arrays law on FPGA", 15 K€ funded by the PPF MIDI (Distributed Microsystems).

2010-2012   Principal Investigator with André Meister (CSEM) of the project "OSCAR – Optimization, Simulation, Control & Application to a network of probes" funded by the French-Switzerland INTERREG IV Program, 248 K€ for our group.

2010   Principal Investigator of "Architecture design of the MEMSALab a software dedicated to MEMS Array design", funded by the PPF MIDI (Distributed Microsystems), 15 K€.

2010   Three year CIFRE Studentship partially supported by the French ANRT for the Phd of Gwenaël Goavec-Merou.

2011   Participation to the project « Design and implementation of approximation of a multiscale method for microsystem arrays » coordinated by Alain Giorgetti and funded by the BQR of Université de Franche-Comté, 5K€.

2012-2016   Responsible of the Work Package on "Modeling, Simulation and Control" and local coordinator in   the project NANOHEAT – FP7, in the ICT Call 7, in the Call STREP with a total budget of 3 995 267 €. The leader was Pawel JANUS from the Instytut Technologii Elektronowej (ITE), Poland. A funding of 400 K€ was allocated to our group.

2013   Principal Investigator of a 6 months Post-doctoral fellowship in the LABEX FIRST-TF.

Conference Talks, Workshops, Colloquia and Plenary Lectures without proceedings

(* = support received from organizers)

1997* Japan-France Joint Seminar on Intelligent Materials and Structures, 27-28 October Sendai, Japon. Organisé par J. Tani et P.F. Gobin.

1999* Séminaire mécanique des fluides turbulents : « Nouvelles générations de modélisation pour écoulements complexes, leur contrôle, leur acoustique », Centre de Physique des Houches, 4-7 Mai 1999. Organisé par P. Perrier et M. Lesieur.

*   Groupe de Travail MECAMAT « Couplage Multiphysiques », Journée « Couplage Mécanique-Electrique », Université de Versailles / Saint-Quentin-en-Yvelines, 10-11 Mai 1999. Organisé par R. Drouot, G. Maugin, D. Perreux, J. Pouget.

*   Partial Differential Equations on Multistructures, Luminy, 19-23 Avril 1999. Organisé par F. Ali Mehmeti et S. Nicaise.

2000* Small Systems Simulation Symposium (SSSS), 4-5 Septembre 2000, Nîs, Yugoslavie. Organisé par Yugoslav Simulation Society, Faculty of Electronic Engineering, Nîs.

*   Optimale Steuerung komplexer dynamischer Strukturen, Oberwolfach, 4-10 Juin 2000, Allemagne. Organisé par K.H. Hoffmann (München), G. Leugering (Bayreuth), J. Sprekels (Berlin), F. Tröltzsch (Chemnitz).

       IUTAM Symposium on Smart Structures and Structronic Systems, 26-29 September 2000, Magdeburg (Germany), Organizers : U. Gabert et H.S. Tzou.

2002   Fifth Micro Colloquium Microstructures, ENPC Paris 5-7/12/2002, "Modeling and control of some mechanical systems with distributed controls".

*   CEA-EDF-INRIA Workshop on Robust Control, 17-22/11/2002, « Parametrization of H-infini controllers for the wave equation".

2003*   School on Modelling, Control and Numerical Simulation of Smart Systems, Pavia 15-19/09/2003, "Modelling and control of piezoelectric structures".

*   Workshop on Distributed Control, Lyon, 1-2 April 2003 : « Contrôles optimaux sur des réseaux de calculateurs embarqués ».

2005*   Workshop Maths-Control, Luminy, 20th June 2005 : « Réalisation de contrôles optimaux pour certains systèmes régis par des Equations aux Dérivées Partielles ».

2010*   Michel Lenczner, Bin Yang, Raj Narayan-Dhara, Hui Hui, Alain Giorgetti, Principles for symbolic derivation of multiscale models, Second Workshop on Thin Structures, Naples, September 9-11, 2010.

        M. Lenczner, H. Hui. A Model of Two-dimensional Array of Cantilevers and its Validation. French Symposium on Emerging Technologies for Micro-nanofabrication - JNTE 10 - Ecole Polytechnique, Palaiseau - November 24-26, 2010.

2011   H. Hui, Y. Yakoubi, M. Lenczner, S. Cogan, A. Meister, M. Favre, R. Couturier and S. Domas. Modeling, Optimization, and State Estimation for an AFM Array. GDR Micro-Nano-Systems. December 14-15, 2011, Marseille, France.

2013   Michel Lenczner, Bin Yang, Walid Belkhir, Towards A Multiscale Model Derivation Tool and its Application to a Device for Scanning Probe Microscopy, Third Workshop on Thin Structures, Naples, September 5-7, 2013.

2014   M. Lenczner, Invited presentation: Algorithms for distributed control on distributed computing architectures. Workshop "Programmable matter (intelligent and reconfigurable)" hosted by AIM 2014, IEEE/ASME International Conference on Advanced Intelligent Mechatronics, July 8-11, 2014, Besançon, France.

        Thi Trang Nguyen, Michel Lenczner, Matthieu Brassart. Homogenization of the one-dimensional wave equation with periodic coefficients. 11th. World Congress on Computational Mechanics, 20-25 July 2014, Barcelona (Spain).

        Bin Yang, Walid Belkhir, Michel Lenczner, Nicolas Ratier. A multiscale model derivation and simulation tool for MEMS arrays. 11th. World Congress on Computational Mechanics, 20-25 July 2014, Barcelona (Spain).

2015   Nguyen Thi Trang, Lenczner Michel and Brassart Matthieu. Homogenization for the one-dimensional wave equation with periodic coefficients in a bounded domain. WAVES 2015 The 12th International Conference on Mathematical and Numerical Aspects of Wave Propagation – KIT (Germany), July 20-24, 2015

P. Janus, A. Sierakowski, M. Zaborowski, P. Grabiec, M. Rudek, T. Gotszalk, B. Yang, M. Lenczner. Design and technology of Scanning Thermal Probe for nanoscale investigations. MicroTherm 2015, 23rd - 25th of June 2015 Lodz, Poland.

M. Lenczner, B. Yang. Two-scale modeling and model-based control law of temperature in an SThM probe. Eurotherm Seminar No 109, Numerical Heat Transfer 2015, 27-30 September 2015, Gliwice-Warsaw, Poland.

2016 **Invited Presentation** : M. Lenczner. A framework for computer-aided derivation of families of multiscale models. Fourth workshop on thin structures. Naples, September 8-10, 2016, Italy. http://www.convegni.unicas.it/WTS2016/Speakers-and-talks

2017 M. Lenczner. A software tool for multi-scale model derivation with an application to a micro mirror array. Workshop HomTap - Homogenization Theory and Application -, 4-6 Octobre 2017, Berlin, Germany. http://www.wias-berlin.de/WCMS/program.jsp?HomTAp2017

Colloquia and Seminars (recents)

2003 Ecole Polytechnique, Applied Mathematics Seminar (Palaiseau), France, "Two-scale model for wave equation"
Paris 6 University (France), Homogenization and Multiple Scale Seminar, J.L. Lions Laboratory. "Homogenization of electronic circuits"

2004 Zurich University (Switzerland), Applied Mathematics Seminar, "Symbolic formulation and diffusive resolution of some operational problems".

2005 Grenoble University, Seminar of the Laboratoire d'Automatique de Grenoble, «Réalisation de contrôles optimaux pour certains systèmes régis par des équations aux dérivées partielles ».

2008 Xi'an University, Seminar of the Laboratory of Mathematics, Nov 2008.

2009 GDR MACS at Lyon (FR), Two-Scale Modelling and Semi-decentralized Approximations of Control for Problems governed by Partial Differential Equations, 05/02/2009
University of Cassino, Cassino (IT), Two-Scale Modelling for Arrays of Microsystems

2010 Ecole Polytechnique, Applied Mathematics Seminar (Palaiseau), France, "A Two-scale model for wave equation with oscillating coefficients and data", 09/11/2010.

2012 University of Sevilla (SP), "A Two-scale model for wave equation with oscillating coefficients and data", 09/02/2012.

2013 Journée FEMTO-ST, Calcul numérique temps réel embarqué sur FPGA, 06/2013.

2014 Journée FEMTO-ST, Poster , Optimization and two-scale modeling for a novel SThM probe, 16/06/2014.

2015 Toward automatic MEMS modeling by asymptotic methods. Politecnico de Milano, department of civil and environmental engineering, Milano. 21 Sept. 2015.
Towards aided multiscale model derivation by asymptotic and rewriting techniques. Institut für geometrie und praktishe mathematic, Aachen. 28 Oct. 2015.

Implication in National Organizations

1994-2002: Corresponding representative of the Société de Mathématiques Appliquées et Industrielles (SMAI) for Besançon

2002-today: Corresponding representative of the Société de Mathématiques Appliquées et Industrielles (SMAI) for Belfort

Collective Responsibilities

2016/01 – Present   Member of the Scientific Council of the FEMTO-ST Institut
2016/01 – Present   Responsible of the Scientific Council of the Time-Frequency Department
2016/06 – Present   Member of Council of the Time-Frequency Department
2017/01 – Present   Member of the COSYMA team

Organization of Workshops and Conferences

Journées Numériques de Besançon: Smart Materials and Structures, 1995 (co-organizer with JM Crolet)
International conference on Smart Materials and Structures, Giens, France, June 1996 (co-organizer with JM Crolet and F. Casciati)
Program Committee: dMEMS 2010, Besançon, France - June 28-29th 2010
Program Committee : Colloque Rencontre Mathématiques-Mécanique in the « 20ème Congrès Français de Mécanique », August 28th – September 2nd, 2011, Besançon, France
Program Committee: dMEMS 2012, Besançon, France - April 2-3th 2012
MEMSALab Workshop, Besançon, September 30 2013.
Steering Committee of the IEEE EUROSIME 2015 conference – 2015-Present. Responsibility of publications in journals.

Organization of Seminars

Fall 94 - Spring 96 Scientific Computation Seminar, Franche-Comté University
Fall 2002 – Spring 2004 Modelling and Control, Belfort-Montbéliard University of Technology

Editorial Activity

2016   Lenczner, M., Rochus, V. Special Issue: Multiphysics Modeling, Simulation and Experiments of Micro and Nanosystems. Mechatronics Vol. 40 (2016)

Invitations

1996   One-month invitation by Chen Liang at the Center for Smart Materials and Structures directed by Craig Rogers at Virginia-Tech, USA.
1997   One-month invitation by H.T. Banks at the North Caroline State University, Center for Research in Scientific Computation.
2005/2006   North Caroline State University, Center for Research in Scientific Computation, invited one year by Ralph Smith
2008/11   Two-weeks invitation by Weihong Zhang at the North Western Polytechnic University
2009/07   One-week invitation by Antonio Gaudiello at the University of Cassino, Cassino (IT).
2012/02   One-week invitation by Juan-Casado Diaz at the University of Sevilla.
2013/01   One-week invitation by Juan-Casado Diaz at the University of Sevilla.
2015/10   One-week invitation by Siegfried Müller at the University of Aachen.
            https://www.igpm.rwth-aachen.de/studium/ws1516-oberseminar
2015/09   One-week invitation by Alberto Corigliano at the Politecnico di Milano.
            http://www.dica.polimi.it/fileadmin/news/1442564968_Sem_LENCZNER.pdf

Referring Papers

2008   Sensor
2009   Journal Journal of Sound and Vibrations, International Journal for Numerical Methods in Engineering
2010   Journal of Mathematical Analysis and Applications
2011   Mechatronics
2012   Optimal Control, Applications and Methods
2013   M3AS and Comptes-Rendus Académie des Sciences Mathématiques
2014   SIAM Journal on Applied Mathematics (SIAP)
2015   Neurocomputing
2016   Mechatronics, European Journal of Mechanics

Referring Projects

2013   ANR-P2N