Curriculum Vitæ

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Anthony Nouy

Professor at Centrale Nantes, France.
Department of Computer Science and Mathematics,
Laboratoire de Mathématiques Jean Leray (UMR CNRS 6629).

Professional experience

Since 2010	:	Full Professor at Centrale Nantes, Department of Mathematics and Computer Science.
2004-2009	:	Associate Professor at Université de Nantes.
2001-2004	:	Adjunct Lecturer at Ecole Normale Supérieure de Cachan and Université Paris 6.
2000-2002	:	Adjunct Lecturer at Centrale Paris.

Education and Degrees

2008	:	Habilitation à Diriger des Recherches, Université de Nantes.
2003	:	Ph.D. Ecole Normale Supérieure de Cachan.
2000	:	Master of Science degree from Université Paris 6, France.
1997-2001	:	Student-Teacher at Ecole Normale Supérieure de Cachan.

Research interests

Numerical analysis, Approximation theory, Probabilistic numerical methods, Statistical learning, Tensor methods, Model order reduction, Uncertainty quantification, Multiscale numerical methods

Scientific production

- 50 articles in international journals
- 2 book chapters
- Over 70 invited lectures in national and international conferences and workshops
- Over 30 invited department seminars
- 10 courses in national conferences, summer schools, and workshops.
- Over 80 other contributed talks in workshops and conferences

Professional activities

Societal activities

- Member of the Administration Board of SMAI (Société de Mathématiques Appliquées et Industrielles).
- Member of the Bureau of the French Research Group Mascot-Num (dealing with stochastic methods for the analysis of numerical codes), since 2011.
- Member of the Bureau of the Group SMAI-SIGMA (Signal Image Geometry Modeling Approximation) since 2016.
- Participation to Research Groups : GDR MoMaS (2008-2011), GDR AMORE (since 2011), GDR MANU (since 2016).
- Editorial board of SIAM Journal on Numerical Analysis (2019-present)
- Editorial board of Advances in Computational Mathematics, Springer (2019-present)
- Editorial board of International Journal for Uncertainty Quantification, Begell House (2018-present)
- Editorial board of Mathematical Problems In Engineering (2011-2013).
- Guest Editor of Advances in Computational Mathematics (Springer), Special issue MoRePaS 2018.

- Guest editor of ScienceOpen Poster Collection MoRePaS 2018.
- Guest Editor of ESAIM:Proceedings, 2014.
- Guest Editor, special issue on "Recent advances in Proper Generalized Decompositions", Archives of Computational Methods in Engineering, 2010.
- Reviewer for international journals: Foundations of Computational Mathematics, SIAM J. Scientific Computing, Computer Methods in Applied Mechanics and Engineering, SIAM Journal on Matrix Analysis and Applications, SIAM J. Uncertainty Quantification, International Journal for Numerical Methods in Engineering, ESAIM: Mathematical Modelling and Numerical Analysis, Journal of Computational Physics, SIAM Journal on Numerical Analysis, Applied Mathematics and Computation, International Journal for Multiscale Computational Engineering, Physica D : Nonlinear Phenomena, Comptes Rendus de l'Académie des Sciences, European J. for Computational Mechanics, Structural Engineering and Mechanics, Mathematical Problems in Engineering, International J. of Computer Mathematics, Probabilistic Engineering Mechanics, Proceedings of the Royal Society A, Reliability Engineering & System Safety, Applied Mathematics Letters
- Thesis reviewer at Ecole Normale Supérieure de Cachan, Université Blaise Pascal, Université de Technologie de Compiègne, Ecole des Mines de Douai, Université de Lille, Université Pierre et Marie Curie, Université Paris 13, University of Brno, Technische Universität Braunschweig, ETH Zurich, Université Paris-Est, Université Paris-Sud, Université Joseph Fourier, Université de La Rochelle, Université de Toulouse, Université de Rennes, Université Paris Sciences et Lettres, Université Paris-Saclay, Université de Liège, Université de Lyon, Université Paris Diderot, Université de recherche Paris Sciences et Lettres, Mines Saint-Etienne, Université de Tours, Université de Ulm, ENS Paris-Saclay, Université de Strasbourg.
- Expert for the funding program of the French National Research Agency (ANR) as member of committee (CES), 2018, 2019.
- Expert for the funding program of the French National Research Agency (ANR), Expert for European Research Council, Expert for IWT's funding program for Strategic Basic Research (SBO) in Belgium, Expert for the Swiss National Science Foundation, Expert for INRIA, Expert for the funding programme of Ville de Paris.
- Expert for HCERES in 2018, 2019.
- Participation to recruiting committees for positions of assistant or full professors in Université de La Rochelle, Université de Nantes, Université Paul Sabatier, Université de Nancy, IFMA Clermont-Ferrand, Ecole Centrale Nantes, Université Paris 6, Université Paris-Est, Mines Saint-Etienne, Centrale Lyon.

Organization of conferences and workshops

- Co-organizer of SIGMA 2020.
- Chairman and organizer of SMAI 2019.
- Chairman and organizer of the conference MoRePaS 2018, Nantes, April 10-13, 2018
- Chairman and organizer of the conference Mascot-Num 2018, Nantes, March 21-23, 2018
- Co-organizer of the conference SIGMA, 30 mar.-3 Apr., CIRM, Marseille, 2020
- Co-organizer of the conference Mascot-Num 2019, Rueil-Malmaison, March 18-20, 2019
- Co-organizer of the international workshop "Numerical methods for high-dimensional problems", Marne-La-Vallée, 2014.
- Co-organizer of the international workshops "Reduced Basis, POD and PGD model reduction techniques": Cachan, November 2012, Blois, November 2013, Cachan November 2015.
- Co-organizer of the workshop "Journées MOMAS Multiphasiques", Nice, 5-7 October 2015.
- Co-organizer of the workshop "TYCHE: modélisations stochastiques en grande dimension pour la propagation et la quantification d'incertitudes en mécanique", Paris, 6-7 December 2012.
- Co-organizer of the national workshop "Journées CSMA 2010", Nantes, 2010.
- Co-organizer of the national conference "JFMS 2008", Nantes 2008.
- Organizer of the working meeting "Stochastic Spectral Methods", IHP, Paris, May 11th 2012
- Co-organizer of minisymposia in international conferences (WCCM 2012 in Brazil, SIAM Linear Algebra 2012 in Spain, SIAM UQ 2014, ICIAM 2015, SIAM UQ 2016, UNCECOMP 2017, ICIAM 2019).

- Co-organizer of minisymposia in national conferences (Giens2009, JFMS2010, MascotNum2012)
- Member of the scientific committee of conferences: CSMA 2011, 2013, 2015 and 2017, JFMS 2010, 2012, 2014 and 2016, UNCECOMP 2015 and 2017, CSMA 2015, Workshop Reduced Basis POD and PGD model reduction techniques 2013 et 2015, MoRePaS 2018, Mascot-Num 2020, MoRePaS 2021.

Schools and Tutorials

- Co-organizer of the summer school CEMRACS 2013 ("Modelling and simulation of complex systems: stochastic and deterministic approaches"), CIRM, Marseille, July-August 2013.
- Co-organizer of the Oberwolfach seminar: "Projection Based Model Reduction: Reduced Basis Methods, POD and Low-Rank tensor approximations", Oberwolfach, November 23-29, 2014.
- Co-organizer of the "Workshop CHORUS: A tutorial on Model order reduction for parametric analyses and uncertainty quantification with applications", IHP, Paris, 20 mars 2014.
- Co-organizer of the summer school CEA/EDF/INRIA "Reduced Order Models for numerical simulation", Paris, 20-24 June, 2016.
- Courses in summer schools and tutorials: Conference JFMS, Nantes, 2008; Summer school ECODOQUI November 2008; French-German Summer school, Pforzheim, Germany, August 2011; French-German Summer School, Porquerolles, September 2014; Ateliers ESNT, Saclay, February 2014; Workshop Chorus, March 2014, Oberwolfach Seminar, November 2014; Ateliers ESNT, Saclay, January 2015; Summer school CEA/EDF/INRIA, 20-24 June, 2016. IHP quarter on Numerical Methods for PDEs, Cargese, September 5-9, 2016. Workshop Frontier Technologies for High-Dimensional Problems and Uncertainty Quantification, Linz, 14-21 December, 2018. Model Order Reduction Summer School, Eindhoven, September 23-27, 2019. Workshop Learning and simulation in high dimension, Airbus Group, Paris, June 25-27, 2019.

Software

- Nouy Anthony, Grelier Erwan and Giraldi Loic. (2020, February 7). ApproximationToolbox. Zenodo. http://doi.org/10.5281/zenodo.3653971

Publications

Book chapters

- A. Nouy. Low-rank methods for high-dimensional approximation and model order reduction. In P. Benner, A. Cohen, M. Ohlberger, and K. Willcox (eds.), *Model Reduction and Approximation: Theory and Algorithms*. SIAM, Philadelphia, PA, 2017.
- A. Nouy. Low-Rank Tensor Methods for Model Order Reduction. In R. Ghanem, D. Higdon, H. Owhadi (Eds), *Handbook of Uncertainty Quantification*. Springer International Publishing, Cham, 2017.

Papers (selected preprints can be found here)

- C. Haberstich, A. Nouy, and F. Perrin. Boosted optimal weighted least-squares. arXiv e-prints, page arXiv:1912.07075, Dec 2019.
- M. Billaud-Friess, A. Falco, and A. Nouy. A geometry based algorithm for dynamical low-rank approximation. *arXiv e-prints*, arXiv:2001.08599, Jan 2020.
- M. Ali and A. Nouy. Singular Value Decomposition in Sobolev Spaces: Part II. arXiv e-prints, page arXiv:1912.11293, Dec 2019.
- E. Grelier, A. Nouy, and R. Lebrun. Learning high-dimensional probability distributions using tree tensor networks. *arXiv preprint arXiv:1912.07913*, 2019.
- O. Balabanov and A. Nouy. Randomized linear algebra for model reduction. part ii: minimal residual methods and dictionary-based approximation. *arXiv preprint arXiv:1910.14378*, 2019.
- M. Billaud-Friess, A. Macherey, A. Nouy, and C. Prieur. Stochastic methods for solving high-dimensional partial differential equations. *arXiv e-prints*, arXiv:1905.05423, May 2019.
- E. Grelier, A. Nouy, and M. Chevreuil. Learning with tree-based tensor formats. *ArXiv e-prints*, arXiv:1811.04455, November 2018.

- O. Balabanov and A. Nouy. Randomized linear algebra for model reduction. part i: Galerkin methods and error estimation. *Advances in Computational Mathematics*, 45(5-6):2969–3019, 2019.
- Q. Ayoul-Guilmard, A. Nouy, and C. Binetruy. Tensor-based numerical method for stochastic homogenisation. *ArXiv e-prints*, arXiv:1805.04320, May 2018.
- A. Falco, W. Hackbusch, and A. Nouy. Tree-based tensor formats. *SeMA Journal*, pp 1-15, Oct 2018.
- M. Ali and A. Nouy. Singular Value Decomposition in Sobolev Spaces: Part I. arXiv e-prints, page arXiv:1809.11001, Sep 2018.
- T. Boiveau, V. Ehrlacher, A. Ern, and A. Nouy. Low-rank approximation of linear parabolic equations by space-time tensor Galerkin methods. ESAIM: M2AN, 53(2):635-658, 2019.
- L. Giraldi and A. Nouy. Weakly intrusive low-rank approximation method for nonlinear parameter-dependent equations. SIAM Journal on Scientific Computing, Online first, 2019.
- A. Nouy. Higher-order principal component analysis for the approximation of tensors in tree-based low rank formats. Numerische Mathematik, 141(3):743–789, Mar 2019.
- A. Falco, W. Hackbusch and A. Nouy. On the Dirac-Frenkel Variational Principle on Tensor Banach Spaces. Foundations of Computational Mathematics, 19(1):159–204, Feb 2019.
- A. Nouy and F. Pled. A multiscale method for semi-linear elliptic equations with localized uncertainties and non-linearities. ESAIM: M2AN, 52(5):1763–1802, 2018.
- Q. Ayoul-Guilmard, A. Nouy, and C. Binetruy. Tensor-based multiscale method for diffusion problems in quasi-periodic heterogeneous media. ESAIM: M2AN, 52(3):869–891, 2018.
- M. Billaud-Friess, A. Falco, and A. Nouy. Principal bundle structure of matrix manifolds. *ArXiv e-prints*, May 2017.
- O. Zahm, M. Billaud-Friess, and A. Nouy. Projection-based model order reduction methods for the estimation of vector-valued variables of interest. SIAM Journal on Scientific Computing, 39(4):A1647–A1674, 2017.
- O. Zahm and A. Nouy. Interpolation of inverse operators for preconditioning parameter-dependent equations. *SIAM Journal on Scientific Computing*, 38(2):A1044–A1074, 2016.
- M. Billaud-Friess and A. Nouy. Dynamical model reduction method for solving parameter-dependent dynamical systems. SIAM Journal on Scientific Computing, 39(4):A1766–A1792, 2017.
- A. Falcó, W. Hackbusch, and A. Nouy. Geometric structures in tensor representations (Final Release). arXiv:1505.03027.
- L. Giraldi, D. Liu, H. G. Matthies, and A. Nouy. To be or not to be intrusive? The solution of parametric and stochastic equations — Proper Generalized Decomposition. SIAM J. Sci. Comp., 37(1):A347-A368, 2015.
- M. Chevreuil, R. Lebrun, A. Nouy, and P. Rai. A least-squares method for sparse low rank approximation of multivariate functions. SIAM/ASA Journal on Uncertainty Quantification, 3(1):897–921, 2015.
- M. Billaud-Friess, A. Nouy and O. Zahm. A tensor approximation method based on ideal minimal residual formulations for the solution of high-dimensional problems, ESAIM: Mathematical Modelling and Numerical Analysis, 48:1777-1806, 2014.
- L. Giraldi, A. Nouy, and G. Legrain. Low-rank approximate inverse for preconditioning tensor-structured linear systems. SIAM Journal on Scientific Computing, 36(4):A1850–A1870, 2014.
- L. Giraldi, A. Litvinenko, D. Liu, H. G. Matthies, and A. Nouy. To be or not to be intrusive? The solution of parametric and stochastic equations - the "plain vanilla" Galerkin case. SIAM Journal on Scientific Computing. 36(6):A2720-A2744, 2014.
- L. Boucinha, A. Ammar, A. Gravouil and A. Nouy. Ideal minimal residual-based proper generalized decomposition for non-symmetric multi-field models – Application to transient elastodynamics in space-time domain. Computer Methods in Applied Mechanics and Engineering. 273:56-76, 2014.
- A. Nouy and C. Soize. Random fields representations for stochastic elliptic boundary value problems and statistical inverse problems. European J. of Applied Mathematics, 25(3):339-373, 2014.
- L. Tamellini, O. Le Maitre, and A. Nouy. Model reduction based on proper generalized decomposi-

tion for the stochastic steady incompressible Navier-Stokes equations. SIAM Journal on Scientific Computing, 36(3):A1089–A1117, 2014.
- M. Chevreuil, A. Nouy, and E. Safatly. A multiscale method with patch for the solution of stochastic partial differential equations with localized uncertainties. Computer Methods in Applied Mechanics and Engineering, 255(0):255-274, 2013.
- L. Giraldi, A. Nouy, G. Legrain, and P. Cartraud. Tensor-based methods for numerical homogenization from high-resolution images. Computer Methods in Applied Mechanics and Engineering, 254(0):154-169, 2013.
- M. Chevreuil and A. Nouy. Model order reduction based on proper generalized decomposition for the propagation of uncertainties in structural dynamics. Int. J. for Numerical Methods in Engineering, 89:241–268, 2012.
- A. Falcó and A. Nouy. Proper generalized decomposition for nonlinear convex problems in tensor Banach spaces. Numerische Mathematik, 121:503-530, 2012.
- A. Nouy, M. Chevreuil, and E. Safatly. Fictitious domain method and separated representations for the solution of boundary value problems on uncertain parameterized domains. Computer Methods in Applied Mechanics and Engineering, 200(45-46):3066–3082, 2011.
- A. Falco and A. Nouy. A Proper Generalized Decomposition for the solution of elliptic problems in abstract form by using a functional Eckart-Young approach. Journal of Mathematical Analysis and Applications, 376(2):469–480, 2011.
- A. Nouy. Proper Generalized Decompositions and separated representations for the numerical solution of high dimensional stochastic problems. Archives of Computational Methods in Engineering, 17(4):403–434, 2010.
- A. Nouy. A priori model reduction through proper generalized decomposition for solving time dependent partial differential equations. Computer Methods in Applied Mechanics and Engineering, 199(23-24):1603–1626, 2010.
- A. Nouy. Identification of multi-modal random variables through mixtures of polynomial chaos expansions. Comptes Rendus Mécanique, 338(12):698–703, 2010.
- A. Nouy and A. Clement. extended stochastic finite element method for the numerical simulation of heterogenous materials with random material interfaces. Int. J. for Numerical Methods in Engineering, 83(10):127–155, 2010.
- A. Nouy and O.P. Le Maître. Generalized spectral decomposition method for stochastic non linear problems. Journal of Computational Physics, 228(1):202–235, 2009.
- A. Nouy. Recent developments in spectral stochastic methods for the numerical solution of stochastic partial differential equations. Archives of Computational Methods in Engineering, 16(3):251–285, 2009.
- F.Chinesta, P. Ladevèze, A. Ammar, E. Cueto, A. Nouy. Proper Generalized Decomposition in Extreme Simulations: Towards a Change of Paradigm in Computational Mechanics? IACM expressions, 26, December 2009.
- F. Schoefs, A. Clement, and A. Nouy. Assessment of roc curves for inspection of random fields. Structural Safety, 31(5):409–419, 2009.
- G. Stefanou, A. Nouy, and A. Clément. Identification of random shapes from images through polynomial chaos expansion of random level-set functions. Int. J. for Numerical Methods in Engineering, 79(2):127–155, 2009.
- A. Nouy and P. Ladevèze. On a computational strategy with time-space homogenization for heterogeneous materials. Journal of the mechanical behaviour Of materials, 19(2-3):151–158, 2009.
- A. Nouy. Generalized spectral decomposition method for solving stochastic finite element equations: invariant subspace problem and dedicated algorithms. Comput. Meth. App. Mech. Eng., 197:4718–4736, 2008.
- A. Nouy, A. Clément, F. Schoefs, and N. Moës. An extended stochastic finite element method for solving stochastic partial differential equations on random domains. Comput. Meth. App. Mech. Eng., 197:4663–4682, 2008.
- A. Nouy. A generalized spectral decomposition technique to solve a class of linear stochastic

partial differential equations. Comput. Meth. App. Mech. Eng., 196(45- 48):4521–4537, 2007.
- A. Nouy. Méthode de construction de bases spectrales généralisées pour l'approximation de problèmes stochastiques. Mécanique & Industries, 8(3):283–288, 2007.
- A. Nouy, F. Schoefs, and N. Moës. X-SFEM, a computational technique based on X-FEM to deal with random shapes. European Journal of Computational Mechanics, 16(2):277–293, 2007.
- H. Yanez-Godoy, F. Schoefs, A. Nouy, and P. Casari. Extreme storm loading on in-service wharf structures. interest of monitoring for reliability updating. European Journal of Environmental and Civil Engineering, 10(5):565–581, 2006.
- A. Nouy and P. Ladevèze. Multiscale computational strategy with time and space homogenization: a radial-type approximation technique for solving micro problems. International Journal for Multiscale Computational Engineering, 170(2):557–574, 2004.
- P. Ladevèze and A. Nouy. On a multiscale computational strategy with time and space homogenization for structural mechanics. Comput. Meth. App. Mech. Eng., 192:3061–3087, 2003.
- P. Ladevèze, A. Nouy, and O. Loiseau. A multiscale computational approach for contact problems. Comput. Meth. App. Mech. Eng., 191:4869–4891, 2002.
- P. Ladevèze and A. Nouy. A multiscale computational method with time and space homogenization. C. R. Mécanique, 330(10):683–689, 2002.