Resume

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Date of birth: May 14, 1980
Nationality: French

Appointments

1997-2001	**Trainee** at Ecole Normale Supérieure de Lyon, France.
2001-2004	**Teaching assistant** - University of Nice, France.
2004-2008	**Assistant professor** - University *Paul Sabatier* of Toulouse, France.
2008-2009	**Associate professor** - University *Paul Sabatier* of Toulouse, France.
2009-2013	**Full Professor 2nd class** - University of Nice Sophia Antipolis, France.
2013-	**Full Professor 1st class** - University of Nice Sophia Antipolis, France.

Education and Degrees

1998-1999	Licence & Maîtrise (equiv. BSc), Mathematics, ENS Lyon.
2000	DEA (equiv. MSc) in Applied Mathematics, University of Lyon, rank 1st.
2000	Agrégation (French national advanced teaching qualification exam), rank 32nd.
2003	**PhD Thesis - Applied Mathematics**, University of Nice, *Several data assimilation methods for environmental problems*
2008	**Habilitation thesis - Applied Mathematics**, University of Toulouse, *Fast algorithms for image processing and data assimilation.*

Main recent responsibilities

2020-	**President of the scientific committee** of UCA HPC cluster (Azzurra)
2016-2022	**President** of the French national HPC committee for mathematics and computer science
2015-2019	**Elected member of Academic and Scientific Council**, French Riviera University
2014-2019	**Deputy director** of LJAD - mathematics department, more than 200 faculty members and PhD students
2013-2017	**PI of STEEP project**, FP7 European Commission, ITN program, $>$ 4 million euros grant
2012-	**Associate member** of CASTOR research team, INRIA Sophia Antipolis
2011-2018	**Director** of applied mathematics and modeling department, Polytech'Nice-Sophia

Research topics

- Data assimilation for geophysical problems, coupling data and models
- Observer design and nudging algorithms
- Optimal control, variational methods, inverse problems, numerical analysis
- Image processing by topological asymptotic expansion
- Image registration and identification of velocity fields from sequences of geophysical images

Scientific production

- 27 publications in international peer-reviewed journals
- 5 peer-reviewed book chapters
- 31 invited international conferences
- 2 softwares
- 17 congress proceedings
- Scholar google: 874 citations, h-index: 16

PhD students supervised

- Edith Taillefer, Optimisation multidisciplinaire de racteurs, co-supervision, University of Toulouse, PhD 2008

- Thierry Touya, Optimisation topologique d'antennes rseau maille irrgulire, co-supervision, University of Toulouse, PhD 2008
- Thomas Migliore, Identification de paramtres et mesures d'incertitude pour un modle de diffusion-convection en milieu poreux, co-supervision, University of Nice, PhD 2009
- Badreddine Rjaibi, Traitement d'images par analyse asymptotique topologique et par morphologie mathmatique, co-supervision, ENIT-LAMSIN (Tunisia), PhD 2012
- Sbastien Marinesque, Le nudging direct et rtrograde pour l'assimilation de donnes, University of Toulouse, PhD 2012
- Audric Drogoul, Dtection de structures fines en imagerie, University of Nice, PhD 2014
- Kateryna Bashtova, Modelling and parameter identification for energy beam footprints, University of Nice, PhD 2016
- Vladimir Groza, Identification of unknown model parameters and sensitivity analysis for abrasive waterjet milling process, University of Nice, PhD 2016
- Samira Amraoui, Assimilation de donnes en gophysique: l'algorithme du Back and Forth Nudging, University of Nice, PhD 2019
- Houcine Turki, Deep learning and data assimilation for industrial applications, Adagos company, Toulouse, in progress
- Louis Lamérand, Assimilation de données et calibration de modèles pour les plasmas de tokamak, Université Côte d'Azur, Nice, in progress

Examiner of 23 PhD theses and 5 habilitation theses.

Main research contrats and grants in last 10 years

2020-2024	National Research Agency grant (ANR SISTEM)
2018-2021	Industrial research contract with Adagos company (deep learning)
2018-2021	National Research Agency grant (FAULTS R GEMS)
2018-2021	Indo-French Center for Applied Mathematics grant (Observers for parameter estimation)
2018-2020	Euro-Mediterranean grant with Tunis, Tunisia (Namred)
2013-2018	Industrial research contract and consulting with Wezr company (weather forecast)
2013-2017	European Commission grant (ITN Steep)
2012-2016	Indo-French Centre for the Promotion of Advanced Research grant (Observers)
2011-2015	National Research Agency grant (MOTIMO)
2009-2015	National Center for Scientific Research grant (INSU BFN)
2009-2012	National Research Agency grant (IODISSEE)

Full list of publications

[1] S. Amraoui et al. *Back-and-Forth Nudging for the quasigeostrophic equations: convergence analysis and prospective application for the future SWOT altimetry mission.* preprint. 2021.

[2] A. Apte, D. Auroux, and V. Vasan. *Observers for tracking an image driven by compressible Navier-Stokes equations.* preprint. 2021.

[3] D. Auroux, M. Manisha, and V. Vasan. "Ocean-depth measurement using shallow-water wave models". In: *Stud. Appl. Math.* (2021).

[4] D. Auroux and B. Rjaibi. *Speckle noise removal in color images using a generalized nonstandard fourth-order variational method.* preprint. 2021.

[5] S. Amraoui et al. "Nudging-based observers for geophysical data assimilation and joint state-parameters estimation". In: *Proc. UCA Complex Days.* 2018.

[6] A. Apte, D. Auroux, and M. Ramaswamy. "Observers for compressible Navier-Stokes equation". In: *SIAM J. Control Optim.* 56.2 (2018), pp. 1081–1104.

[7] D. Auroux. "Data assimilation for geophysical fluids". In: *Ann. Fac. Sci. Toulouse* 26.4 (2017), pp. 767–793.

[8] D. Auroux and V. Groza. "Optimal parameters identification and sensitivity study for abrasive waterjet milling model". In: *Inv. Prob. Sci. Eng.* 25.11 (2017), pp. 1560–1576.

[9] D. Auroux, J. Blum, and G. Ruggiero. "Data assimilation for geophysical fluids: the Diffusive Back and Forth Nudging". In: *Mathematical Paradigms of Climate Science.* Ed. by F. Ancona et al. Vol. 15. INdAM Series. Springer, 2016, pp. 139–174.

[10] D. Auroux and V. Groza. "Sensitivity studies and parameter identification for noisy 3D moving AWJM model". In: *Int. J. Eng. Math.* (2016), pp. 1–15.

[11] G. A. Ruggiero et al. "Data assimilation experiments using the diffusive back and forth nudging for the NEMO ocean model". In: *Nonlin. Proc. Geophys.* 22 (2015), pp. 233–248.

[12] D. Auroux. *Assimilation de données en géophysique.* Images des Mathématiques, Les échos de la recherche. 2014.

[13] D. Auroux, J. Blum, and M. Nodet. "A new method for data assimilation: the Diffusive Back and Forth Nudging algorithm". In: *Proc. Int. Conf. Inverse Problems in Engineering (ICIPE).* 2014.

[14] A. Drogoul, G. Aubert, and D. Auroux. "Topological gradient for a fourth order PDE and application to the detection of fine structures in 2D and 3D images". In: *IEEE International Conference on Image Processing 2014 (ICIP 2014).* 2014.

[15] D. Auroux, P. Bansart, and J. Blum. "An evolution of the Back and Forth Nudging for geophysical data assimilation: application to Burgers equation and comparisons". In: *Inv. Prob. Sci. Eng.* 21.3 (2013), pp. 399–419.

[16] D. Auroux, J. Blum, and S. Marinesque. "Data assimilation: variational methods and back and forth nudging algorithm, application to thermoacoustic tomography". In: *Proc. 11th Int. Conf. Mathematical and Numerical Aspects of Waves.* 2013, pp. 69–80.

[17] D. Auroux, J. Blum, and M. Nodet. "A new method for data assimilation: the back and forth nudging algorithm". In: *MAMERN13: 5th International Conference on Approximation Methods and Numerical Modelling in Environment and Natural Resources.* 2013.

[18] D. Auroux et al. “Data assimilation experiments using the Back and Forth Nudging and NEMO OGCM”. In: *Proc. 6th World Meteorol. Org. Symp. Data Assimilation*. 2013.

[19] Y. Ahipo et al. “A hybrid scheme for contour detection and completion based on topological gradient and fast marching algorithms - Application to inpainting and segmentation”. In: *Proc. SSVM 2011, 3rd Int. Conf. Scale Space Var. Methods Comput. Vision*. 2012, pp. 386–397.

[20] D. Auroux and M. Nodet. “The back and forth nudging algorithm for data assimilation problems: theoretical results on transport equations”. In: *ESAIM Control Optim. Calc. Var.* 18.2 (2012), pp. 318–342.

[21] E. Cosme et al. “Smoothing problems in a Bayesian framework and their linear Gaussian solutions”. In: *Month. Weath. Rev.* 140.2 (2012), pp. 683–695.

[22] D. Auroux, J. Blum, and M. Nodet. “Diffusive Back and Forth Nudging algorithm for data assimilation”. In: *C. R. Acad. Sci. Paris, Ser. I* 349.15-16 (2011), pp. 849–854.

[23] D. Auroux and S. Bonnabel. “Symmetry-based observers for some water-tank problems”. In: *IEEE Trans. Automat. Contr.* 56.5 (2011), pp. 1046–1058.

[24] D. Auroux, L. D. Cohen, and M. Masmoudi. “Contour detection and completion for inpainting and segmentation based on topological gradient and fast marching algorithms”. In: *Int. J. Biomed. Imaging* (2011). DOI:10.1155/2011/592924.

[25] D. Auroux and J. Fehrenbach. “Identification of velocity fields for geophysical fluids from a sequence of images”. In: *Exp. Fluids* 50.2 (2011), pp. 313–328.

[26] J.-C. Yakoubsohn et al. “Approximate GCD a la Dedieu”. In: *Appl. Math. E-Notes* 11 (2011), pp. 244–248.

[27] A. Apte, D. Auroux, and M. Ramaswamy. “Variational data assimilation for discrete Burgers equation”. In: *Proc. 8th UAB Conf. Diff. Eqns. and Comput. Simul.* Vol. 19. Electron. J. Diff. Eqns., 2010, pp. 15–30.

[28] D. Auroux, L. Jaafar Belaid, and B. Rjaibi. “Application of the topological gradient method to color image restoration”. In: *SIAM J. Imaging Sci.* 3.2 (2010), pp. 153–175.

[29] D. Auroux, L. Jaafar Belaid, and B. Rjaibi. “Application of the topological gradient method to tomography”. In: *ARIMA Proc. TamTam’09*. 2010.

[30] Y. Parte et al. “Collaborative optimization”. In: Multidisciplinary design optimization in computational mechanics. Wiley-ISTE, Apr. 2010, pp. 321–368.

[31] D. Auroux. “Extraction of velocity fields for geophysical fluids from a sequence of images”. In: *Proc. IEEE Int. Conf. Acoustics, Speech and Signal Processing*. 2009, pp. 961–964.

[32] D. Auroux. “From restoration by topological gradient to medical image segmentation via an asymptotic expansion”. In: *Math. Comput. Model.* 49.11-12 (2009), pp. 2191–2205.

[33] D. Auroux. “The back and forth nudging algorithm applied to a shallow water model, comparison and hybridization with the 4D-VAR”. In: *Int. J. Numer. Methods Fluids* 61.8 (2009), pp. 911–929.

[34] D. Auroux and J. Blum. “The Back and Forth Nudging algorithm for oceanographic data assimilation”. In: *Proc. WMODA 5*. 2009, pp. 273.1–273.8.

[35] D. Auroux and M. Masmoudi. “Image processing by topological asymptotic analysis”. In: *Mathematical Methods for Imaging and Inverse Problems*. Vol. 26. ESAIM Proc., 2009, pp. 24–44.

[36] D. Auroux and M. Masmoudi. “Image processing by topological asymptotic expansion”. In: *J. Math. Imaging Vision* 33.2 (2009), pp. 122–134.

[37] D. Auroux et al. “État de l’art et nouvelles tendances en conception collaborative”. In: Optimisation multidisciplinaire en mécanique 1. Hermes Science Publications, Apr. 2009.

[38] D. Auroux. *Fast algorithms for image processing and data assimilation*. Habilitation à Diriger des Recherches (Habilitation Thesis), University of Toulouse, France. Nov. 2008.

[39] D. Auroux, P. Bansart, and J. Blum. “An easy-to-implement and efficient data assimilation method for the identification of the initial condition: the Back and Forth Nudging (BFN) algorithm”. In: *Proc. Int. Conf. Inverse Problems in Engineering*. Vol. 135. J. Phys.: Conf. Ser., 2008.

[40] D. Auroux and J. Blum. “A nudging-based data assimilation method for oceanographic problems: the Back and Forth Nudging (BFN) algorithm”. In: *Nonlin. Proc. Geophys.* 15 (2008), pp. 305–319.

[41] D. Auroux and M. Masmoudi. “Image processing by topological asymptotic analysis”. In: *Proc. IEEE Int. Conf. Acoustics, Speech and Signal Processing*. 2008, pp. 777–780.

[42] M. Masmoudi, D. Auroux, and Y. Parte. “The state of the art in Collaborative Design”. In: *Comput. Fluid Dyn. J.* (2008). Accepted for publication.

[43] T. Touya and D. Auroux. “Control and topological optimization of a large multibeam array antenna”. In: *Proc. ARP 2008 - Antennas, Radar, and Wave Propagation*. Ed. by A. Daryoush. ACTA Press, 2008.

[44] D. Auroux. “Generalization of the dual variational data assimilation algorithm to a nonlinear layered quasi-geostrophic ocean model”. In: *Inverse Problems* 23 (2007), pp. 2485–2503.

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[46] D. Auroux, M. Masmoudi, and L. Jaafar Belaid. “Image restoration and classification by topological asymptotic expansion”. In: Variational Formulations in Mechanics: Theory and Applications, E. Taroco, E.A. de Souza Neto and A.A. Novotny (Eds). Barcelona, Spain: CIMNE, 2007, pp. 23–42.

[47] G. Caille et al. “Large multibeam array antennas with reduced number of active chains”. In: *Proc. EuCAP 2007 - Antennas and Propagation*. 2007, pp. 142–150.

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[49] D. Auroux and M. Masmoudi. “A one-shot inpainting algorithm based on the topological asymptotic analysis”. In: *Comp. Appl. Math.* 25.2-3 (2006), pp. 1–17.

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[51] D. Auroux and J. Blum. “Data assimilation methods for an oceanographic problem”. In: vol. XVI. Lecture Notes - Mathematics in Industry. Springer-Verlag, 2004, pp. 179–194.

[52] D. Auroux. “Étude de quelques méthodes d’assimilation de données pour l’environnement”. PhD thesis. Université de Nice Sophia-Antipolis, Dec. 2003.

[53] D. Auroux. "Assimilation variationnelle de données océanographiques - Approches primale et duale". In: *Proc. Colloque Mathématiques et océanographie.* 9(2). Annales Mathématiques Blaise Pascal, 2002, pp. 147–159.

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[55] F. Veersé and D. Auroux. *Some numerical experiments on scaling and updating L-BFGS diagonal preconditioners.* Tech. rep. 3858. INRIA, 2000.

[56] F. Veersé, D. Auroux, and M. Fisher. "Limited-memory BFGS diagonal preconditioners for a data assimilation problem in meteorology". In: *Optim. Engineer.* 1.3 (2000), pp. 323–339.