

## Pierre F.J. Lermusiaux

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### Education

Ph.D. in Engineering Sciences, May 1997    Harvard University – DEAS, Cambridge, MA  
S.M. in Applied Physics, May 1993        Harvard University – DEAS, Cambridge, MA  
B./M. in Mech. Engineering, June 1992    Liege University, Belgium

### Biography/Research Interests

Dr. Lermusiaux is an Associate Professor of Mechanical Engineering and Ocean Science and Engineering at MIT. He received a Fulbright Foundation Fellowship (1992), the Wallace Prize at Harvard (1993), the Ogilvie Young Investigator Lecture in Ocean Eng. at MIT (1998), and the MIT Doherty Chair in Ocean Utilization (2009-2011). In 2010, the School of Eng. at MIT awarded him with the Ruth and Joel Spira Award for Distinguished Teaching. He has made outstanding contributions in data assimilation, as well as in ocean modeling and uncertainty predictions. His research thrusts include understanding and modeling complex physical and interdisciplinary oceanic dynamics and processes. With his group, he creates, develops and utilizes new mathematical models and computational methods for ocean predictions and dynamical diagnostics, for optimization and control of autonomous ocean systems, for uncertainty quantification and prediction, and for data assimilation and data-model comparisons. He has participated in many national and international sea exercises. He has served on numerous committees and organized major meetings. He is associate editor in three journals. He has more than hundred refereed publications.

### Selected Professional Experience

Harvard U., DEAS	Post-Doctoral Fellow	1997	– 1999
Harvard U., DEAS	Research Associate	2000	– 2006
MIT, Mech. Eng.	Assoc. Prof., without tenure	01/01/2007	– 06/30/2012
MIT, Mech. Eng.	Assoc. Prof., with tenure	07/01/2012	– Present

### Selected Subset of Recent Institutional and Professional Service

Editorial Board, International Journal of Ocean & Oceanography	Apr 2005 - Present
Associate Editor: Ocean Dynamics, Springer; Ocean Modeling, Elsevier	Jan 2008 - Present
Editor of four special issues: Ocean Dynamics (3); Dyn. Atm. & Oc. (1)	May 2007 - Present
Group Leader for ONR QPE and PLUS-INP programs	Jan 2007 - Dec 2011
Advisory Board, European Stochastic Assimilation (SANGOMA)	Nov 2012–Nov 2015
National Research Council, U.S. Research Agenda to Advance Sub-seasonal to Seasonal Forecasting, Committee Member	Jul 2014 – Jul 2016
Advisory board – EU “Maritime Integrated Surveillance Awareness (MARISA)”	Aug 2016 – Present
SIAM Activity Group on Geosciences - Prize Committee Member	Aug 2016 - Present
National Academies’ Committee on “Advancing Understanding of Gulf of Mexico Loop Current Dynamics”	Jan 2017 - Present
MIT Committees (e.g.): MIT/WHOI Joint Committee for Applied Ocean Science and Engineering; Presidential Committee for Distinguished Fellowships; MechE Strategic Planning, Graduate Policy, PhD Qualifier Exam Review, Graduate Admission Chair (2014-Present), 2015-2016 MechE Strategic Planning (co-chair), MIT/WHOI Joint Committee for Physical Oceanography	
Organizer of multiple sessions of the AGU “Ocean Sciences” and EGS Union Meetings	
Reviewer of manuscripts, articles and proposals for multiple editors, journals and agencies	

### Current Professional Organization Membership

Association of the Engineers of Liege; The Friends of the University of Liege	1992-Present
American Geophysical Union	1997-Present

The Oceanography Society	1999-Present
American Association for the Advancement of Science	2007-Present
SIAM, IEEE and ASME	2009-Present

## Awards

Fellow, Robert L. Wallace Prize Fellowship from Harvard Univ.	1993
Fellow and Honorary Fellow, Fulbright Foundation	1992–97
Honorary Fellow Award, Belgian American Educational Foundation	1992–97
Annual T. Francis Ogilvie Young Investigator Lecture, MIT-OE.	1998
CIMAS Invited Scientist, U. of Miami	2002
MIT Doherty Chair in Ocean Utilization (2009-2011)	2008
Ruth and Joel Spira Award for Distinguished Teaching, SoE, MIT.	2010

## 2016-2017 Refereed Publications (Journals and Proceedings)

1. Uecker mann, M.P. and P.F.J. Lermusiaux, 2016. *Hybridizable Discontinuous Galerkin Projection Methods for Navier-Stokes and Boussinesq Equations*. J. of Computational Physics, 306, 390–421. <http://dx.doi.org/10.1016/j.jcp.2015.11.028>.
2. Lermusiaux P.F.J, T. Lolla, P.J. Haley. Jr., K. Yigit, M.P. Uecker mann, T. Sondergaard and W.G. Leslie, 2016. *Science of Autonomy: Time-Optimal Path Planning and Adaptive Sampling for Swarms of Ocean Vehicles*. Chapter 21, Springer Handbook of Ocean Engineering, ed. by M. Dhanak, N. Xiros (Springer, Berlin, Heidelberg 2015), 481–498.
3. Subramani, D.N. and P.F.J. Lermusiaux, 2016. Energy-optimal Path Planning by Stochastic Dynamically Orthogonal Level-Set Optimization. *Ocean Modeling*, 100, 57–77. DOI: 10.1016/j.ocemod.2016.01.006.
4. *Next Generation Earth System Prediction: Strategies for Sub-Seasonal to Seasonal Forecasts*, 2016. Committee on “Developing a U.S. Research Agenda to Advance Sub-seasonal to Seasonal Forecasting”, National Research Council, Board on Atmospheric Sciences and Climate, The National Academies Press, Washington, DC.
5. Heaney, K. D., P. F. J. Lermusiaux, T. F. Duda and P. J. Haley Jr., 2016. *Validation of Genetic Algorithm Based Optimal Sampling for Ocean Data Assimilation*. *Ocean Dynamics*. 66: 1209-1229. DOI 10.1007/s10236-016-0976-5.
6. Kelly, S.M. and P.F.J. Lermusiaux, 2016. *Internal-tide Interactions with Gulf Stream and Middle Atlantic Bight Shelfbreak Front*. *Journal of Geophysical Research - Oceans*. 121, 6271–6294, doi:10.1002/2016JC011639.
7. Kelly, S.M., P.F.J. Lermusiaux, T. F. Duda, and P.J. Haley Jr., 2016. *A Coupled-mode Shallow Water model for tidal analysis: Internal-tide reflection and refraction by the Gulf Stream*. *Journal of Physical Oceanography*. 46, 3661–3679, doi: 10.1175/JPO-D-16-0018.1.
8. Lolla, T. and P.F.J. Lermusiaux, 2017a. *A Gaussian–Mixture Model Smoother for Continuous Nonlinear Stochastic Dynamical Systems: Theory and Scheme*. *Monthly Weather Review*. doi:10.1175/MWR-D-16-0064.1.
9. Lolla, T. and P.F.J. Lermusiaux, 2017b. *A Gaussian–Mixture Model Smoother for Continuous Nonlinear Stochastic Dynamical Systems: Applications*. *Monthly Weather Review*. doi:10.1175/MWR-D-16-0065.1.
10. Sun, W., P. Tsiotras, T. Lolla, D. N. Subramani, and P. F. J. Lermusiaux, 2017. *Multiple-Pursuer-One-Evader Pursuit Evasion Game in Dynamic Flow Fields*. *Journal of Guidance, Control and Dynamics*. In press.
11. Lolla, T. and P.F.J. Lermusiaux, 2017. *A Forward Reachability Equation for Minimum-Time Path Planning in Strong Dynamic Flows*. *SIAM Journal on Control and Optimization*, sub-judice.
12. Subramani, D.N., P. J. Haley Jr., and P.F.J. Lermusiaux, 2017. *Energy-Optimal Path Planning in the Coastal Ocean*. *Journal of Geophysical Research - Oceans*. Sub-judice.
13. Feppon, F. and P.F.J. Lermusiaux, 2017. *A Geometric Approach to Dynamical Model-Order Reduction*. *SIAM Journal on Matrix Analysis and Applications*, sub-judice.
14. Sun, W., P. Tsiotras, T. Lolla, D.N. Subramani, and P.F.J. Lermusiaux, 2017b. *Pursuit-Evasion Games in Dynamic Flow Fields via Reachability Set Analysis*. 2017 American Control Conference. In press.
15. Subramani, D. N., P. F. J. Lermusiaux, P.J. Haley, Jr., C. Mirabito, S. Jana, C. S. Kulkarni, A. Girard, D. Wickman, J. Edwards, J. Smith, 2017. *Time-Optimal Path Planning: Real-Time Sea Exercises*. In: *Oceans '17 MTS/IEEE Aberdeen*, 19-22 June 2017, Sub-judice.
16. Edwards, J., J. Smith, A. Girard, D. Wickman, D. N. Subramani, C. S. Kulkarni, P.J. Haley, Jr., C. Mirabito, S. Jana, P. F. J. Lermusiaux, 2017 *Data-driven Learning and Modeling of AUV Operational Characteristics for Optimal Path Planning*. In: *Oceans '17 MTS/IEEE Aberdeen*, 19-22 June 2017, Sub-judice.
17. Mirabito, C., D.N. Subramani, T. Lolla, P.J. Haley, Jr., A. Jain, P.F.J. Lermusiaux, C. Li, D.K.P. Yue, Y. Liu, F.S. Hover, N. Pulsone, J. Edwards, K.E. Railey, G. Shaw, 2017 *Autonomy for Surface Ship Interception*. In: *Oceans '17 MTS/IEEE Aberdeen*, 19-22 June 2017, Sub-judice.
18. Feppon, F. and P.F.J. Lermusiaux, 2017. *Dynamically Orthogonal numerical schemes for efficient stochastic advection and Lagrangian transport*. *SIAM Review*. Sub-judice.
19. Aoussou, J., J. Ling, and P.F.J. Lermusiaux, 2017. *Iterative Pressure-Correction Methods for the Unsteady Incompressible Navier-Stokes Equations*. *Journal of Computational Physics*. Sub-judice.
20. Feppon, F. and P.F.J. Lermusiaux, 2017. *The extrinsic geometry of continuous time matrix algorithms*. *SIAM Journal on Matrix Analysis and Applications*. Sub-judice.

Other Publications available from: <http://mseas.mit.edu/publications>