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## Anthony T Patera

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Professor of Mechanical Engineering*

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### People

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#### **Administrative Contact:**

Debra Blanchard  
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#### **Education**

Ph.D. in Applied Mathematics, Massachusetts Institute of Technology,  
Cambridge, MA, February 1982  
S.M. in Mechanical Engineering, Massachusetts Institute of Technology,  
Cambridge, MA, February 1980  
B.S. in Mechanical Engineering, Massachusetts Institute of Technology,  
Cambridge MA, August 1978

#### **MIT Positions**

2006– present	Ford Professor of Engineering
1997– 2006	SoE Professor of Teaching Innovation
1991– present	Full Professor, Mechanical Engineering
1985– 1988	Associate Professor, Mechanical Engineering
1982– 1985	Assistant Professor, Mechanical Engineering

#### **MIT Service**

2009– 2010	Chair, ad hoc Committee on Conceptual Design for Singapore University of Design and Technology, MIT
2008– present	Co-Director, MIT Center for Computational Engineering, MIT
2004– 2005	Chair, Strategic Planning Committee, MechE Department
2001– 2006	MIT Co-Director, Singapore-MIT Alliance, MIT
1989– 1994	Co-Director, MIT Cray Supercomputer Facility, MIT

#### **Principal Publications (last 5 years)**

1. K Urban and AT Patera, "An Improved Error Bound for Reduced Basis Approximation of Linear

- Parabolic Problems." *Submitted to Mathematics of Computation*, (in press 2013).
2. DBP Huynh, DJ Knezevic, and AT Patera, " A Static Condensation Reduced Basis Element Method: Approximation and A Posteriori Error Estimation," *Math Model Numer Anal*, (47(1): 213--251, 2013. doi: [10.1051/m2an/2012022](https://doi.org/10.1051/m2an/2012022)
  3. AT Patera and EM Rønquist, *Regression on Parametric Manifolds: Estimation of Spatial Fields, Functional Outputs, and Parameters from Noisy Data*. CR Acad Sci Paris, Series I 350(9-10):543-547, 2012. doi:[10.1016/j.crma.2012.05.002](https://doi.org/10.1016/j.crma.2012.05.002)
  4. K Urban and AT Patera, " A New Error Bound for Reduced Basis Approximation of Parabolic Partial Differential Equations," *CR Acad Sci Paris Series I* 350(3-4):203– 207, 2012. doi:[10.1016/j.crma.2012.01.026](https://doi.org/10.1016/j.crma.2012.01.026)
  5. A Buffa, Y Maday, AT Patera, C Prud'homme, and G Turinici, " A Priori Convergence of the Greedy Algorithm for the Parametrized Reduced Basis," *Math Model Numer Anal*, 46(3):595– 603, 2012. doi:[10.1051/m2an/2011056](https://doi.org/10.1051/m2an/2011056)
  6. JL Eftang, DBP Huynh, DJ Knezevic, and AT Patera, " A Two-Step Certified Reduced Basis Method." *J Sci Comput*, 51:28– 58, 2012. doi:[10.1007/s10915-011-9494-2](https://doi.org/10.1007/s10915-011-9494-2)
  7. DBP Huynh, DJ Knezevic, and AT Patera, " Certified Reduced Basis Model Validation: A Frequentistic Uncertainty Framework," *Comput Methods Appl Mech Engrg*, 201-204:13– 24, 2012. doi:[10.1016/j.cma.2011.09.011](https://doi.org/10.1016/j.cma.2011.09.011)
  8. JL Eftang, DJ Knezevic, and AT Patera, " An hp Certified Reduced Basis Method for Parametrized Parabolic Partial Differential Equations," *Math Comput Model Dyn Syst*, 17(4):395– 422, 2011. doi:[10.1080/13873954.2011.547670](https://doi.org/10.1080/13873954.2011.547670)
  9. DBP Huynh, DJ Knezevic, and AT Patera, " A Laplace Transform Certified Reduced Basis Method; Application to the Heat Equation and Wave Equation," *CR Acad Sci Paris Series I*, 349(7-8):401– 405, 2011. doi:[10.1016/j.crma.2011.02.003](https://doi.org/10.1016/j.crma.2011.02.003)
  10. DBP Huynh, DJ Knezevic, JW Peterson, and AT Patera, " High-Fidelity Real-Time Simulation on Deployed Platforms," *Computers and Fluids*, 43 (1):74– 81, 2011. doi:[10.1016/j.compfluid.2010.07.007](https://doi.org/10.1016/j.compfluid.2010.07.007)
  11. DJ Knezevic, NC Nguyen, and AT Patera, " Reduced Basis Approximation and A Posteriori Error Estimation for the Parametrized Unsteady Boussinesq Equations," *Math Models Methods Appl Sci*, 21(7):1415– 1442, 2011. doi:[10.1142/S0218202511005441](https://doi.org/10.1142/S0218202511005441)
  12. DJ Knezevic and AT Patera, " A Certified Reduced Basis Method for the Fokker-Planck Equation of Dilute Polymeric Fluids: FENE Dumbbells in Extensional Flow," *SIAM J on Scientific Computing*, 32(2):793– 817, 2010. doi:[10.1137/090759239](https://doi.org/10.1137/090759239)
  13. DBP Huynh, DJ Knezevic, Y Chen, JS Hesthaven, and AT Patera, " A Natural-Norm Successive Constraint Method for Inf-Sup Lower Bounds," *Comput Methods Appl Mech Engrg*, 199:1963– 1975, 2010. doi:[10.1016/j.cma.2010.02.011](https://doi.org/10.1016/j.cma.2010.02.011)
  14. S Boyaval, C Le Bris, T Lelièvre, Y Maday, NC Nguyen, and AT Patera, " Reduced Basis Techniques for Stochastic Problems," *Arch Comput Methods Eng*, 17(4):435– 454, 2010. doi:[10.1007/s11831-010-9056-z](https://doi.org/10.1007/s11831-010-9056-z)
  15. JL Eftang, AT Patera, and EM Rønquist, An " hp " Certified Reduced Basis Method for Parametrized Elliptic Partial Differential Equations. *SIAM Journal on Scientific Computing*, 32(6):3170– 3200, 2010. doi:[10.1007/978-3-642-15337-2\\_15](https://doi.org/10.1007/978-3-642-15337-2_15)
  16. JL Eftang, MA Grepl, and AT Patera, " A Posteriori Error Bounds for the Empirical Interpolation Method," *CR Acad Sci Paris Series I*, 348(9– 10):575– 579, 2010. doi:[10.1016/j.crma.2010.03.004](https://doi.org/10.1016/j.crma.2010.03.004)
  17. Y Maday, NC Nguyen, AT Patera, and GSH Pau, " A General Multipurpose

- Interpolation Procedure: The magic points," *Communications on Pure and Applied Analysis*, 8(1): 383– 404, 2009. [doi:10.3934/cpaa.2009.8.383](https://doi.org/10.3934/cpaa.2009.8.383)
18. NC Nguyen, G Rozza, and AT Patera, " Reduced Basis Approximation and A Posteriori Error Estimation for the Time-Dependent Viscous Burgers Equation," *Calcolo*, 46(3):157– 185, 2009. [doi:10.1007/s10092-009-0005-x](https://doi.org/10.1007/s10092-009-0005-x)
  19. S Boyaval, C Le Bris, Y Maday, NC Nguyen, and AT Patera, " A Reduced Basis Approach for Variational Problems with Stochastic Parameters: Application to Heat Conduction with Variable Robin Coefficient," *Comput Methods Appl Mech Engrg*, 198(41-44):3187– 3206, 2009. [doi:10.1016/j.cma.2009.05.019](https://doi.org/10.1016/j.cma.2009.05.019)
  20. NC Nguyen, AT Patera, and J Peraire, " A ' best points' interpolation method for efficient approximation of parametrized functions," *Int J Numer Meth Engrg*, 73(4): 521– 543, 2008. [doi:10.1002/nme.2086](https://doi.org/10.1002/nme.2086)
  21. G Rozza, DBP Huynh, and AT Patera, " Reduced Basis Approximation and A Posteriori Error Estimation for Affinely Parametrized Elliptic Coercive Partial Differential Equations — Application to Transport and Continuum Mechanics," *Arch Comput Methods Eng*, 15(3): 229– 275, 2008. [doi:10.1007/s11831-008-9019-9](https://doi.org/10.1007/s11831-008-9019-9)

### Honors and Awards

Best Paper in Thermophysics in 1984, American Institute of Aeronautics and Astronautics (1984)

MIT Mechanical Engineering Den Hartog Award for Excellence in Teaching (1987)

Giovanni Sacchi-Landriani Prize in Numerical Analysis, Lombardy Academy of Sciences and Letters, Milan (1994)

Hans Kupczyk Guest Professorship Award 2010, Universität Ulm, Germany (2010)

Honorary Member, Société de Mathématiques Appliquées et Industrielles (SMAI, France) (2012)

"Chaire d'Excellence," Fondation Sciences Mathématiques de Paris (January 2013)

US Association for Computational Mechanics Thomas JR Hughes Medal (July 2013)

### Professional Service

DARPA Materials Research Council and Defense Sciences Research Council (1986– 2004)

Co-Editor in Chief, *Mathematical Modelling and Numerical Analysis (M2AN)* (2003– 2012)

Member, Editorial Board, Springer-Verlag Book Series on Modeling, Simulations & Applications (2008– present)

Member, Editorial Board, *Advanced Modeling and Simulation in Engineering Sciences* (2013– present)

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