

Tata Institute of Fundamental Research
Centre for Applicable Mathematics
Post Bag No. 6503, Chikkabommasandra
Bangalore 560065 India
Email: apte@math.tifrbng.res.in

Office: +91 (0)80 6695 3725
Inst.: +91 (0)80 6695 3795
Fax: +91 (0)80 6695 3799

Web: <http://math.tifrbng.res.in/~apte/>

EDUCATION

- The University of Texas at Austin, Texas, USA
Ph.D., Physics, May 2004
Dissertation: “Numerical Studies of the Standard Nontwist Map and a Renormalization Group Framework for Breakup of Invariant Tori”
Supervisor: Philip J. Morrison
- Indian Institute of Technology, Kanpur, India
M.Sc., Physics, May 1996

EMPLOYMENT AND TEACHING EXPERIENCE

- *Joint Faculty*, International Centre for Theoretical Sciences, Tata Institute of Fundamental Research, Bangalore, India: October 2008 - present
- *Fellow*, Center for Applicable Mathematics, Tata Institute of Fundamental Research, Bangalore, India: July 2007 - present
- *Postdoctoral Fellow*, Mathematical Sciences Research Institute (MSRI), Berkeley, California, USA: January - May 2007
- *Postdoctoral Researcher*, Department of Mathematics, University of North Carolina, Chapel Hill, NC, USA: August - December 2006
 - *Instructor*: Math 233 “Multivariable Calculus,” Fall 2006
- *Postdoctoral Fellow*, Statistical and Applied Mathematical Sciences Institute (SAMSI), Durham NC, USA: January 2005 - August 2006
- University of Texas, Austin, Texas, USA
 - *Graduate Research Assistant*, Institute for Fusion Studies: June 2000 - May 2004
 - *Assistant instructor*: August 1999 - May 2000
 - *Teaching Assistant*: August 1996 - August 1999

PUBLICATIONS*Refereed -*

1. A. Apte, "Renormalization group operators for maps and universal scaling of universal scaling exponents," *Physica D* **240** 317-322 (2010)
2. A. Apte, D. Auroux, Mythily Ramaswamy, "Variational data assimilation for discrete Burgers equation," *Electronic Journal of Differential Equations, Conference* **19** 15-30 (2010)
3. A. Apte, C.K.R.T. Jones, A. M. Stuart, and J. Voss, "Data Assimilation: Mathematical and Statistical Perspectives," *Int. J. Numer. Methods in Fluids* **56**, 1033 (2008)
4. A. Apte, C.K.R.T. Jones, and A. M. Stuart, "A Bayesian approach to Lagrangian data assimilation," *Tellus A* **60**, 336-347 (March 2008)
5. T.B. Krause, P.J. Morrison, and A. Apte, "A unique approach to the Darwin approximation," *Phys. Plasmas* **14** 102112 (October 2007)
6. A. Apte, M. Hairer, A. M. Stuart, and J. Voss, "Sampling the posterior: an approach to non-Gaussian data assimilation," *Physica D* **230**, 50-64 (June 2007)
7. K. Fuchss, A. Wurm, A. Apte, and P.J. Morrison, "Breakup of shearless meanders and 'outer' tori in the standard nontwist map," *Chaos* **16**, 033120 (September 2006)
8. A. Apte, R. de la Llave, and E. Petrisor, "Comment on 'Reconnection scenarios...'," *Chaos Solitons and Fractals* **14**, 117 (2002)," *Chaos Solitons and Fractals* **27**, 1115 (2006)
9. A. Wurm, A. Apte, K. Fuchss and P.J. Morrison, "Meanders and reconnection-collision sequences in the standard nontwist map," *Chaos* **15**, 023108 (June 2005)
10. A. Apte, R. de la Llave, and N.P. Petrov, "Regularity of critical invariant circles of the standard non-twist map," *Nonlinearity* **18**, 1173-1187 (May 2005)
11. A. Apte, A. Wurm, and P.J. Morrison, "Renormalization for breakup of invariant tori," *Physica D* **200**, 47-59 (January 2005)
12. A. Wurm, A. Apte, and P.J. Morrison, "On reconnection phenomena in the standard nontwist map," *Brazilian Journal of Physics* **34**, 1700-1706 (December 2004)
13. A. Apte, A. Wurm, and P.J. Morrison, "Renormalization and destruction of $1/\gamma^2$ tori in the standard nontwist map," *Chaos* **13**, 421-433 (June 2003)

submitted / in preparation -

1. Md. Nurujjaman, S. Shivamurthy, A. Apte, T. Singla, P. Parmananda, "Effect of discrete time observations on synchronization in Chua model and applications to data assimilation," *submitted to Chaos*
2. A. Apte, C.K.R.T. Jones, "Saddles and centers: effects of nonlinearity on data assimilation," *in preparation*

PUBLICATIONS

Non-refereed, proceedings, reports -

1. A. Apte, Ravi Nanjundiah, Vijay Chandru, Roddam Narasimha, Spenta Wadia, "Report of the ICTS program 'Scientific discovery through intensive exploration of data'," Submitted to the Scientific Advisory Committee to the Prime Minister of India, April 2011, and a shortened version to Current Science
2. A. Apte, C.K.R.T. Jones, and A. M. Stuart, "A Bayesian approach to Lagrangian data assimilation: Langevin sampling and model error," *Proceedings of the International Conference on Recent Developments in Nonlinear Systems and Dynamics*, Bharathidasan University, Tiruchirapalli, India, February 2008
3. A. Apte, "Wave-mean-flow interaction in Oldroyd-B fluid," *Proceedings of the 2003 Program in Geophysical Fluid Dynamics* Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA <http://gfd.who.edu/proceedings/2003/PDFvol2003.html>

SYNERGETIC ACTIVITIES

1. Co-organizer, "Homi Bhabha Birth Centenary Symposium on Hyperbolic PDE and Related Topics," TIFR-CAM, Bangalore, India, July 2009
2. Co-convener, "Scientific discovery through intensive data exploration," Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, India (≈ 30 speakers, ≈ 50 participants); 02 - 11 February 2011
3. Co-organizer, "Monsoon School on Mathematical and Statistical Foundations of Data Assimilation, and International Conference on Data Assimilation," TIFR Centre for Applicable Mathematics and the Indian Institute of Science, Bangalore, India (≈ 20 speakers, ≈ 40 participants); 04 - 23 July 2011

PRESENTATIONS

Invited talks, colloquia, seminars -

1. Workshop on "Generalized Hamiltonian structure of differential equations and dissipative dynamical systems," University of Kent, UK, June 2011
2. Colloquium, Raman Research Institute, Bangalore India, April 2011
3. Round Table Meeting on Weather and Climate Modelling, Centre for Development of Advanced Computing (C-DAC), Bangalore India, February 2011
4. National Conference on Nonlinear Sciences and Dynamics, Tiruchirapalli, India, January 2010
5. Indo-French Workshop on Applied Mathematics, Indian Institute of Science, Bangalore India, December 2010
6. Perspectives in Nonlinear Dynamics PNLD 2010, Bangalore India, July 2010
7. European Geosciences Union General Assembly 2010, session on "Data assimilation and inverse problems in the presence of nonlinearities," Vienna Austria, May 2010

8. International Conference on Turbulence, Indian Institute of Technology Kanpur, India, December 2009
9. II Indo-Brazil Symposium in Mathematics, TIFR Centre for Applicable Mathematics, Bangalore India, December 2009
10. Colloquium, Institut de Mathematiques de Toulouse, Universite Paul Sabatier, France, June 2009
11. Colloquium, Department of Mathematics, Universidad Nacional de Colombia, Bogota Colombia, May 2009
12. National Conference on Nonlinear Sciences and Dynamics, Kolkata, India, March 2009
13. Colloquium, Indian Institute of Technology Kanpur, India, February 2009
14. Junior DA Researchers Day, University of Reading UK, December 2008
15. Bangalore Probability Seminar, Indian Institute of Science, Bangalore India, November 2008
16. International Conference on Nonlinear Dynamical Systems and Turbulence, Indian Institute of Science, Bangalore, India, July 2008
17. Colloquium, Indian Institute of Technology, Mumbai, May 2008
18. National Seminar on “Generalizations and Approximations in Mathematics,” Visva-Bharati University, India, March 2008
19. Colloquium, Indira Gandhi Centre for Atomic Research, India, March 2008
20. Colloquium, Indian Institute of Technology, Chennai, India, March 2008
21. Symposium in honour of 60th birthday of Professor S.G. Dani, Bangalore, India, December 2007
22. Seminar at National Aeronautics Laboratory, Bangalore India, October 2007
23. Workshop on “Environmental Modeling and Data Assimilation,” University of Warwick, Coventry, UK, November 2007
24. Seminar at Institute for Plasma Research, Ahmedabad, India, February 2007
25. Seminar at Institute of Mathematical Sciences, Chennai, India, February 2007
26. Seminar at TIFR Center, Bangalore, India, February 2007
27. Workshop on “Mathematics of Data Assimilation,” University of Warwick, Coventry, UK, May 2006
28. Department of Mathematics and Mechanics seminar, Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas (IIMAS), UNAM, Mexico City, Mexico, November 2004
29. Plasma Theory Group seminar, Los Alamos National Laboratory, November 2004
30. Working Dynamical Systems seminar, University of Texas, Austin TX, October 2004

Contributed talks -

1. Conference “Geometric Methods for Infinite-Dimensional Dynamical Systems,” Brown University, Providence, RI, USA, November 2011
2. SIAM Conference on Applications of Dynamical Systems, Snowbird Utah, USA, May 2011
3. Workshop on “Stochastic Differential Equation Models with Applications to the Insulin-Glucose System and Neuronal Modelling,” Middlefart, Denmark, August 2008
4. National Conference on Nonlinear Sciences and Dynamics, Ahmedabad, India, January 2008
5. International Conference “Chaos, Complexity and Transport: Theory and Applications,” Marseille, France, June 2007
6. SIAM Conference on Applications of Dynamical Systems, Snowbird Utah, USA, May 2007
7. SIAM Conference on Applications of Dynamical Systems, Snowbird Utah, USA, May 2005

Lecture series -

1. DST SERC school in nonlinear dynamics, IISER, Pune India, December 2011
2. Workshop on PDE and related analysis, Institute Mathematics Initiative of Indian Institute of Science, Bangalore India, September 2009
3. “Applications of Hamiltonian dynamical systems,” Universidad Nacional de Colombia, Bogota Colombia, May 2009
4. “Data assimilation: statistical and deterministic approaches,” Universidad Nacional de Colombia, Bogota Colombia, April-May 2009
5. Indo-German Workshop-cum-Lecture Series on “Computational Models and Methods Driven by Industrial Problems,” Indian Institute of Technology Madras, Chennai, India, November 2008
6. DST-SERC School on Nonlinear Dynamics, Indian Institute of Science, Bangalore India, July 2008

Graduate level teaching -

1. 2009 Fall and 2010 Fall: “Ordinary differential equations”
2. 2008 Spring and 2008 Fall: “Classical mechanics”

Popular science / expository lectures -

1. Workshop on “Design and Analysis of Algorithms,” Nitte Meenakshi Institute of Technology, Bangalore India, October 2009
2. Bishop Cotton College, Bangalore India, October 2009
3. St. Joseph College, Bangalore, India, January 2009
4. Christ College, Bangalore, India, September 2008

5. Government Science College, Bangalore, India, March 2008
6. Maharani Ammani College, Bangalore, India, February 2008

Posters -

1. Conference on Nonlinear Dynamics: Integrability and Chaos, Bharathidasan University, Tiruchirapalli, India, February 2008
2. Nonlinear Evolution Equations and Dynamical Systems (NEEDS), L'Ametlla de Mar, Spain, June 2007
3. SIAM Conference on Applications of Dynamical Systems, Snowbird UT, May 2007
4. Workshop on Data Assimilation, SAMSI, May 2006
5. SIAM Conference on Applications of Dynamical Systems, Snowbird UT, May 2005
6. Sherwood Fusion Theory Conference, Missoula MN, April 2004
7. Annual meeting of the APS Division of Plasma Physics, Albuquerque NM, October 2003
8. SIAM Conference on Applications of Dynamical Systems, Snowbird UT, May 2003
9. Sherwood Fusion Theory Conference, Corpus Christi TX, April 2003
10. Annual meeting of the APS Division of Fluid Dynamics, Dallas TX, November 2002
11. Annual meeting of the APS Division of Plasma Physics, Orlando FL, October 2002
12. Sherwood Fusion Theory Conference, Rochester NY, April 2002

PROJECTS AND FELLOWSHIPS

1. "Wave-mean-flow interactions in Oldroyd-B fluid." Project completed as a Fellow at the Summer Program in Geophysical Fluid Dynamics, Woods Hole Oceanographic Institute, Woods Hole MA, August 2003 - Supervisor: Oliver Bühler, Courant Institute, NY
2. "A search for CH stars in globular clusters." E. Ambrose, A. Apte, T. Krause, M. Wolf; Project for the "Observational Astronomy" class at UT Austin, Summer 2001.
3. "Entropy of $\mathcal{N} = 4$ supersymmetric theory and its relation to black holes." Qualifier seminar, UT Austin, December 1998; Collaborator: Li Jiang; Supervisor: Willy Fischler
4. "Entropy changes during nucleosynthesis in the early universe." Project at the Vacation Students' Programme at Inter University Center for Astronomy and Astrophysics (IUCAA), Pune, India, August 1994; Supervisor: N.C. Rana, IUCAA

SERVICES

- Referee for *Chaos, Communications in Nonlinear Science and Numerical Simulation, Discrete and Continuous Dynamical Systems, Physica D, Physical Review, Journal of Earth System Science, and Current Science*
- Elected as Membership Coordinator (1999-2000), Food Buyer (Summer 2000), and Director (Fall 2000) of Laurel House Cooperative, Austin TX

- Judge for Texas State Science Fair, Austin TX, 1999
- Workshop leader in “Holding office hours and dealing with student problems” and “Sharing concerns” sessions and participant in “Experienced TAs and AIs and UT undergraduate students” session of Fall 1999 and Summer 2000 International Teaching Assistants’ Workshop, University of Texas, Austin

LANGUAGES

Marathi (native), English (near-native), Hindi and Spanish (fluent)