

VISWANATH RAMAKRISHNA
PROGRAM IN MATHEMATICAL SCIENCES
UNIVERSITY OF TEXAS AT DALLAS
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EDUCATION

- 1988-1991 **Doctoral Degree in Systems Science and Mathematics**, Thesis title “Symmetries and Singularities in Nonlinear Design”, Advisor - Professor Heinz Schättler, Washington University in St. Louis.
- 1986-1988 **M.S. in Systems Science and Mathematics**, Washington University in St. Louis.
- 1984-1986 **M. Sc in Mathematics**, Indian Institute of Technology, Madras, India.
- 1981-1984 **B. Sc(Honours) in Physics**, St. Stephen’s College, University of Delhi, India.

Employment History

- Fall 2005 - to date, **University of Texas at Dallas**, Professor, Department of Mathematical Sciences.
- Fall 2001-Fall 2005, **University of Texas at Dallas**, Associate Professor, Department of Mathematical Sciences.
- Fall 1995 - Fall 2001 **University of Texas at Dallas**
Assistant Professor, Mathematical Sciences.
- 1992-1995 **Princeton University**
Member Research Staff, Department of Chemistry and Program in Applied and Computational Mathematics.
- 1991-1992 **The University of California at Davis**
Visiting Assistant Professor, Department of Mathematics and Institute of Theoretical Dynamics.
- 1986 - 1991 **Washington University in St. Louis**
Research Fellow, Department of Systems Science and Mathematics.
- 1990-1991 **Washington University in St. Louis**
Instructor, Department of System Science and Mathematics.
- 1988-1990 **Washington University in St. Louis**
Teaching Assistant, Department of Systems Science and Mathematics.

Research and Outreach Interests:

- *Current Principal Interests:* Quantum Information Processing, Control & Computation, Structured Matrices & Operators, Optical Signal Processing & Computation, Nanophotonics, Numerical Linear Algebra, Nonassociative Algebras, Nonlinear Estimation, Signal Processing and Control, Applications to Chemical Physics, Quantum Optics and Spectroscopy and Aircraft Guidance

- *Current Secondary Interests: Geometric Aspects of Partial Differential Equations, Singular Systems of Differential Equations, Computational Algebra*

Publications: a) Peer Refereed Articles:

1. “Analysis of a Polynomial System Arising in the Design of an Optical Lattice Filter Useful in Channelization”, Billy Cheek, Mieczyslaw Dabkowski, Amr El Nagdi, Louis R. Hunt, T. J. LaFave Jr., Ke Liu, Duncan L. MacFarlane and Viswanath Ramakrishna, *Acta Applicandae Mathematicae*, Vol. 118, Apr. 2012, pp. 107-123.
2. “Four-Port Nanophotonic Frustrated Total Internal Reflection Coupler”, D. L. MacFarlane, M. P. Christensen, K. Liu, T. P. LaFave Jr., N. Sultana, N. Huntoon, A. Stark, T. W. Kim, L. R. Hunt, J. Kim, J. Kirk, M. Dabkowski, V. Ramakrishna, G. A. Evans, *IEEE Photonics Technology Letters*, Vol. 24, 2012, pp. 58-60.
3. “Experiment and Theory of an Active Optical Lattice Filter”, D. L. MacFarlane, M. P. Christensen, A. ElNagdi, G. A. Evans, L. R. Hunt, N. Huntoon, J. Kim, T. W. Kim, J. Kirk, T. P. LaFave Jr, K. Liu, V. Ramakrishna, M. Dabkowski, N. Sultana, *IEEE Journal of Quantum Electronics*, Vol. 48, 2012, pp. 307-317.
4. “Minimal Polynomials of Some Matrices Via Quaternions”, V. Ramakrishna, Y. Ansari & F. Costa, *Advances in Applied Clifford Algebras*, Vol 22, Issue 1, pg 159-183, (2012).
5. “Active Integrated Filters for RF-Photonic Channelizers”, A. ElNagdi, K. Liu, T. P. LaFave Jr, L. R. Hunt, V. Ramakrishna, M. Dabkowski, D. L. MacFarlane, M. P. Christensen, *Sensors*, **11**, No 2, 1297-1320, (2011).
6. G. Chen, V. Ramakrishna & Z. Zhang, “A Unified Approach to Universality for Three Distinct Types of 2-Qubit Quantum Computing Devices”, *AMS - Contemporary Mathematics : Cross-Disciplinary Approaches to Quantum Computing*, Volume 536, Pg 17-32 (2011).
7. M. Dabkowski, A. El Nagdy, L. R. Hunt, Ke Liu, D. L. MacFarlane and V. Ramakrishna, “Extended Active Optical Lattice Filters: Filter Synthesis”, *Journal of the Optical Society of America A*, **27**, No 4, 895-910 (2010).
8. A. El Nagdy, L. R. Hunt, D. L. MacFarlane and V. Ramakrishna, ‘Extended Active Tunable Optical Lattice Filters Enabled By Four- Dimensional Couplers: Systems Modelling”, *Journal of the Optical Society of America A*, **26**, No 8, A1-A10 (2009).
9. “ On the Non-compact portion of $Sp(4, R)$ via Quaternions” Y. Ansari & V. Ramakrishna, *J. Phys A: Math. Theor*, **41**, 335203, 1-12, (2008).
10. “Parametrizations of Positive Matrices With Applications”, M. Tseng, H. Zhou & V. Ramakrishna, in the refereed volume, *Mathematics of Quantum Computation and Technology*, 387-403, G. Chen, L. Kaufmann and S. Lomonaco editors, CRC Press, 2007
11. “Dilation Theoretic Parametrizations of Positive Matrices With Applications to Quantum Information Processing”, M. Tseng & V. Ramakrishna, in the refereed volume, *Operator Theory: Structured Matrices and Dilations*, Theta Series in Advanced Mathematics, 341-357, M. Bakonyi, A. Gheondea, M. Putinar and J. Rovnyak editors, 2007.
12. “On the Exponential of Matrices in $su(4)$ ”, V. Ramakrishna& H. Zhou, *J. Phys. A - Math & General*, **39** (2006), 3021-3034.

13. "Composition methods for four-port couplers in photonic integrated circuitry", T. Constantinescu, V. Ramakrishna, N. Spears, L. R. Hunt, J. Tong, I. Panahi, G. Kannan, D. L. MacFarlane, G. Evans, and M. P. Christensen, *Journal of Optical Society of America A*, **23** (2006), 2919-2931.
14. "Analysis and design of active optical filter structures with two-port couplers", G. Kannan, I. M. S. Panahi, D. L. MacFarlane, L. R. Hunt, J. Tong, V. Ramakrishna, T. Constantinescu, and N. Spears, *IEEE/OSA Journal of Lightwave Technology*, **24** (2006), 2637-2647.
15. "On the Exponential of Some Structured Matrices", V. Ramakrishna & F. Costa, *J. Phys. A - Math & General*, **Vol 37**, 11613-11627, 2004.
16. "Optimal Discrimination of Multiple Quantum Systems: Controllability Analysis", G. Turinici, V. Ramakrishna, B. Li and H. Rabitz, *J. Phys. A: Math and General*, **Vol 37**, 273-282, 2004.
17. T. Constantinescu and V. Ramakrishna, "Parametrizing Quantum States and Channels *Quantum Information Processing*, **Volume 2**, No 3, 221-248, 2003.
18. T. Constantinescu and V. Ramakrishna, "On a Parametrization of Purifications of a Qubit", *Quantum Information Processing*, **Volume 1**, No 5, 409-424, (manuscript published in 2003 - though the issue is dated in 2002).
19. V. Ramakrishna, R. J. Ober, K. L. Flores and H. Rabitz, Control of a coupled two spin system without hard pulses, *Physical Review A*, **65**, 063405 - 1 -9, 2002 (also nominated for the Virtual Journal of Ultrafast Science, July 2002).
20. "Constructive control of quantum systems using factorizations of unitary operators", S. Schirmer, A. Greentree, V. Ramakrishna and H. Rabitz, *J. Phys. A. Math and General*, **35**, 8315-8339, 2002.
21. B. Li, G. Turinici, V. Ramakrishna and H. Rabitz, Optimal dynamic discrimination of similar molecules through quantum learning control, *J. Phys. Chem B*, **106**, 8125-8131, 2002.
22. "Control of Molecular Systems With Very Few Phases", V. Ramakrishna, *Chemical Physics*, Vol 267, 25-32, June 2001.
23. "Quantum Control by Decompositions of $SU(2)$ ", V. Ramakrishna, K. Flores, H. Rabitz and R. Ober, *Physical Review A*, Vol 62, 054309 - 1 to 054309 - 11, October 2000.
24. "Parameter Variations, Relative Degree and Stable Inversion", V. Ramakrishna, L. R. Hunt and G. Meyer, *Automatica*, Vol 37, 871-880, 2001.
25. "Explicit Generation of Unitary Transformations in a Single Atom or Molecule", V. Ramakrishna, R. Ober, X. Sun, O. Steuernagel, J. Botina and H. Rabitz, *Physical Review A*, Volume 61, April 1999, 032106 -1 - 032106-6.
26. "On the Role of Reachability and Observability in NMR Experimentation", R. Ober, V. Ramakrishna and E. Ward, in *Journal of Mathematical Chemistry*, **26**, 15-26, 1999.
27. "Guidance and Stable and Unstable Manifolds In the Presence of Inputs" L. R. Hunt, G. Meyer and V. Ramakrishna, in *International Journal of Robust and Nonlinear Control*, **9**, 85 - 99, 1999.
28. "On Degenerate Monge-Ampere Equations", V. Ramakrishna, American Mathematical Society Proceedings of the Symposia in Pure Mathematics, Vol 64, "Differential Geometry and Control", Pg 257-277, G. Ferreyra, R. Gardner, H. Hermes and H. Sussmann eds, 1999.
29. "Stable Inversion and Continuous Dependence on Parameters", L. R. Hunt, V. Ramakrishna and G. Meyer, in *System-Control Letters*, Vol 34, 203-207, 1998.

30. "Control of Classical Regime Molecular Objectives - Applications of Tracking and Variations on the Theme", Y. Chen, P. Gross, V. Ramakrishna, H. Rabitz and K. Mease, in *Automatica*, Vol 33, No 9, 1997, 1617-1634.
31. "On the Relation Between Quantum Computing and Quantum Controllability", V. Ramakrishna and H. Rabitz, *Phys Rev A*, Vol 54,1715 -1716, August 1996.
32. "Control of Molecular Motion", M. Dahleh, A. Peirce, H. Rabitz and V. Ramakrishna, *Proceedings of the IEEE*, Vol 84, No 1, 7-13, January 1996, (Caption from the article also appears on the cover of the issue)
33. "Disturbance Decoupling Via Differential Forms", V. Ramakrishna, *The Journal of Mathematical Systems, Estimation and Control*, Summary in Vol 6, No 3, 1996, 367-369. Full paper published electronically on July 1st 1996, 29 pages, available from www.birkhauser.com, Retrieval Code 34649. Originally the paper was also to appear in hard print but the journal was disbanded in 1999. If there are any questions please contact Birkhauser.
34. "Selective Excitation of Molecular Eigenstates Using State - Dependent Optical Field Design ", Y. Chen, P. Gross, V. Ramakrishna, H. Rabitz and K. Mease, *Chem Phys Letters*, 252, 447-456, April 1996.
35. "Competitive Tracking of Molecular Objectives Described by Quantum Mechanics", Y. Chen, P. Gross, V. Ramakrishna, H. Rabitz and K. Mease, in *J. Chemical Physics*, Vol 102, No 20, 8001-8010, May 1995
36. "Local Solvability of Degenerate, Overdetermined Systems - A Control Theoretic Perspective", V. Ramakrishna, *The Journal of Differential Equations*, Vol 123, No 1, 260-304, Nov 1995.
37. "Controllability of Molecular Systems", V. Ramakrishna, M. Salapaka, M. Dahleh, H. Rabitz and A. Peirce, in *Physical Review A*, Vol 51, No 2, 960 - 966, Feb 1995.
38. "Controlled Invariance for Singular Distributions", V. Ramakrishna, *SIAM Journal of Control and Optimization*, Vol 32, No 3, 790 - 807, May 1994.
39. " Optimally Designed Potentials for Control of Electron-Wave Scattering in Semiconductor Nanodevices", P. Gross, V. Ramakrishna, E. Villalonga, H. Rabitz, M. Littman, M. Shayegan and S. Lyon, *Physical Review B*, Vol 49, No 16, 11 100-110, April 1994.
40. " Controlled Invariant Distributions and Group Invariance" V. Ramakrishna and H. Schaettler, *The Journal of Mathematical Systems, Estimation and Control*, May 1991, No 2, 209-240.

b) Papers in Edited Volumes:

1. " Quantum Computing - A Brief Mathematical Course", Z. Zhang, V. Ramakrishna & G. Chen, accepted for publication in *Mathematical Horizons For Quantum Physics*, H. Araki, B. G. Englert, L. C. Kwek & J. Suzuki editors, Editors, *Lecture Notes Series, Institute for Mathematical Sciences, National University of Singapore, World Scientific*, Singapore (2010).
2. "The Partial Differential Equations of Controlled Invariance", V. Ramakrishna, in **Computation and Control III**, 313-333, K. Bowers and J. Lund editors, Birkauser, Boston, 1993.
3. "Control Applications in Chemical Physics", V. Ramakrishna and H. Rabitz, Proceedings of II Mexican School on Gravitation and Mathematical Physics, December 6th 1996, Tlaxcala, Mexico, 35th Annivesary of Cinvestav (proceedings will be available only electronically, for details of the site where they will be posted please contact Professor Tonatiuh Matos, tmatos@fis.cinvestav.mx).

4. “Control of Molecular Dynamics”, V. Ramakrishna and H. Rabitz, in **Systems Modelling and Optimization**, M.Polis, A. Dontchev, P.Kall, I.Lasiecka and A. Olbrot, Eds., Chapman & Hall/CRC Research Notes in Mathematics, Vol. 396, pp.495-503, 1999.

c) Papers in Refereed Conference Proceedings :

1. “Two Dimensional Optical Lattice Filters with Gain: Fabrication and Experimental Results”, D. L. MacFarlane, M. P. Christensen, A. ElNagdy, G. A. Evans, L. R. Hunt, N. Huntoon, J. Kim, T. W. Kim, J. Kirk, T. P. LaFave Jr, K. Liu, V. Ramakrishna, N. Sultana, in the Proceedings of IQEC/CLEO (International Quantum Electronics/Conference on Lasers and Electro-Optics), Pacific Rim Conference, 28 August - 1st September, (2011), Sydney, Australia.
2. “Active Lattice Filter with Nanophotonic FTIR-Couplers for Integrated Photonic Channelizer”, M. P. Christense, D. L. MacFarlane, L. R. Hunt, J. Y. Kim, T. W. Kim, T.P. LaFave Jr, K. Liu, A. ElNagdy, N. Sultana, V. Ramakrishna, N. Huntoon, M. Dabkowski, in the Proceedings of the *IEEE Photonics Global Conference* (2010), Pgs 1-4, DOI 10.1109/PGC.2010.5705959.
3. “Active Optical Lattice Filters With Nanophotonic Four-port Couplers”, D. L. MacFarlane, M. P. Christensen, L. R. Hunt, J. Y. Kim, T. W. Kim, T.P. LaFave Jr, K. Liu, A. ElNagdy, N. Sultana and V. Ramakrishna, in the Proceedings of the 15th OptoElectronics and Communications Conference, Sapporo, Japan, July5-9th, 2010.
4. “Chip-Scale Analog Optical Signal Processing”, D. L. MacFarlane, L. R. Hunt, V. Ramakrishna, W. Zhou, N. Sultana, A. Stark, M. Christensen and G. A. Evans, *Proceedings of the IEEE LEOS Annual 2008 Meeting*, November 10-14th, 2008, Newport Beach, CA (invited).
5. “Active Optical Lattice Filters as Programmable ODE Solvers”, L. R. Hunt, N. Spears, T. Constantinescu, G. Kannan, D. MacFarlane, I. Panahi, V. Ramakrishna & J. Tong, *IEEE-LEOS Summer Topical*, San Diego, CA, July 25th-27th, 2005, 33-34.
6. “Active Optical Lattice Filters”, D. MacFarlane, J. Tong, L. R. Hunt, I. Panahi, T. Constantinescu, V. Ramakrishna, G. Evans & M. Christensen, *IEEE-LEOS Summer Topical*, San Diego, CA, July 25th-27th, 2005, 43-44.
7. T. Constantinescu and V. Ramakrishna, “Some Parametrizations of Mixed Quantum States Motivated by Quantum Information”, in the Proceedings of the Conference on Lagrangian & Hamiltonian Methods in Nonlinear Control (IFAC), Seville, April 2003.
8. “Controllability of a Pair of Coupled Quantum Dots”, V. Ramakrishna, in the Proceedings of the Mathematical Theory of Networks and Systems Conference, August 2002, Notre Dame, IN (available only electronically, D. Gilliam and J. Rosenthal editors).
9. “Non-Unitary Models in Quantum Control”, V. Ramakrishna, in the Proceedings of the IEEE Conference on Decision and Control, December 2002, Las Vegas NV. i
10. “Constructive Control of a Spin System Via Periodic Controls” V. Ramakrishna, R. Ober, K. Flores, and H. Rabitz in the Proceedings of the 40th IEEE Conference on Decision and Control, Pg 292-297, Orlando, December 2001 (available with me as a CD-ROM).
item “Control of Some Quantum Systems - The Role of Phases”, V.Ramakrishna, R. J. Ober and H. Rabitz, the Proceedings of the International Federation of Automatic Control’s Nonlinear Controls Symposium (NOLCOS 2001), St. Petersburg, Russia, July 2001, Pages 1499 - 1502.

11. "Path Planning for Systems With Drift Motivated by and Applied to Quantum Control", V. Ramakrishna, K. Flores, H. Rabitz and R. Ober, in the Proceedings of the IEEE Conference on Decision and Control, Sydney, December 2000 (available with me as a CD-Rom)
12. "NMR Spectroscopy - Systems, Transfer Functions, Reachability and Other System Theoretic Notions", R. Ober, V. Ramakrishna and E. Ward, in the Proceedings of the IEEE Conference on Decision and Control, Sydney, December 2000 (available with me as a CD-Rom)
13. "Quantum Control Techniques for Switched Electrical Networks", K. Flores and V. Ramakrishna, in the Proceedings of the IEEE Conference on Decision and Control, Sydney, December 2000 (available with me as a CD-Rom)
14. "Accounting for Singularities in Design", V. Ramakrishna, in the *Proceedings of the 38th IEEE Control and Decision Conference*, Phoenix, Arizona, 1611-1616, IEEE Press, Piscataway, NJ, December 1999.
15. "Singularities and Continuous Dependence of the Steady-State Solution", V. Ramakrishna, L. R. Hunt and G. Meyer, in the *Proceedings of the 38th IEEE Control and Decision Conference*, Phoenix, Arizona, 2926-2929, IEEE Press, Piscataway, NJ, December 1999.
16. "Constructive Generation of States in Quantum Control", V. Ramakrishna, R. Ober and H. Rabitz, in the Proceedings of the Conference on the Mathematical Theory of Networks and Systems, Padova, July 1998, R. Beghi et al., editors, IL POLIGRAFICO publishing, Padova, Italy.
17. "On the Role of Reachability for the Design of NMR experiments", R. Ober, V. Ramakrishna and E. Ward, in the Proceedings of the Conference on the Mathematical Theory of Networks and Systems, Padova, July 1998, R. Beghi et al., editors, IL POLIGRAFICO publishing, Padova, Italy.
18. "Continuous Dependence on Parameters in Nonlinear Tracking", L. R. Hunt, G. Meyer and V. Ramakrishna, in the *Proceedings of the 36th IEEE Control and Decision Conference, San Diego, California*, IEEE Press, New York, December 1997
19. "Output Tracking and Nonlinear Steady State", L. R. Hunt, G. Meyer and V. Ramakrishna, *Proceedings of the 35th IEEE Control and Decision Conference, Kobe, Japan*, 2064-2068, IEEE Press, New York, December 1996.
20. "Composition and Division Theorems and Controlled Decomposition", *Invited Paper for the 1995 CDC, Proceedings of the 34th IEEE Control and Decision Conference, New Orleans, Louisiana*, 3300-3306, IEEE Press, Piscataway, NJ, December 1995.
21. "Controlled Invariant Singular Foliations - Additional Results", V. Ramakrishna, *Invited by SIAM, Proceedings of the 32nd, IEEE Control and Decision Conference, San Antonio, Texas*, 2550-2505, IEEE Press, New York, December 1993.
22. "Controlled Invariance for Singular Distributions - The Smooth Case", V. Ramakrishna, *Invited by SIAM, Proceedings of the 31st, IEEE Control and Decision Conference, Tucson, Arizona*, 108-110, IEEE Press, New York, December 1992.

d) Technical Reports:

1. "Explicit Generation of Unitary Transformations Via a Single Atom or Molecule", V. Ramakrishna, R. Ober, O. Steuernagel, H. Rabitz and J. Botina, Center for Engineering Mathematics Report No 14, July 1998.

2. "On the Role of Reachability and Observability in NMR Experimentation", R. Ober, V. Ramakrishna and E. Ward, Center for Engineering Mathematics Report No 15, September 1998.
3. "The Effect of Singularities on Feedback Linearization", V. Ramakrishna and L. Hunt, Center for Engineering Mathematics Report No 16, December 1998.
4. "Invariant Solutions to Certain Nonlinear First Order PDEs", V. Ramakrishna, Department of Mathematics Technical Report No 11, October 1997.
5. "Arcs in Prime Spectra of Commutative Rings", V. Ramakrishna, Department of Mathematics Technical Report No 12 , October 1997.
6. "Robust Decoupling for Nonlinear Systems", V. Ramakrishna, Department of Mathematics Technical Report No 13 , October 1997.

e): Book Reviews:

1. Book Review of *Partial Stability and Control*, V. I. Vorotnikov, *IEEE Transactions on Automatic Control*, **45**, 2199 (2000).
2. Book Review of *Investment Science*, D. Luenberger, on Amazon.

f) Manuscripts on the Los Alamos arXiv, xxx.lanl.gov To date there are fourteen such articles. Only a sample of these is listed.

1. "On a Quaternionic Representation for $Sp(4, R)$ ", Y. Ansari and V. Ramakrishna, arXiv, math-ph 0801.4402, January 28th, 2008.
2. "Quantum Control Using Sequences of Simple Pulses", S. G. Schirmer, A. D. Greentree, V. Ramakrishna and H. Rabitz, arXiv, quant-ph 0105155.
3. "Comments on "Quantum Control by Decompositions of $SU(2)$ " ", V. Ramakrishna, arXiv quant-ph 0106147.
4. "A Note on the Controllability of Molecular Systems", V. Ramakrishna, arXiv quant-ph 0107003.
5. "Control of Switched Networks Via Quantum Methods", K. L. Flores and V. Ramakrishna, arXiv quant-ph 0110001.

g) Invited Lectures :

Since I do not remember the exact dates for some of the talks, I have only listed the month and year below.

1. "Quantum Dots, Squids and Cavity QED: A Unified Approach Via Lie Theory", Knots in Washington, December 2012, Washington DC.
2. "Remarks on Computing the Williamson Normal Form", at the *AMS* Annual Meeting, Boston, January 6th, (2012).

3. “Decompositions of the Unitary Group Applied to Quantum Control and Modelling”, presented in the NSF sponsored conference *Mathematical Analysis and Control in Chemical Physics and Related Systems*, University of Nevada at Las Vegas, December 16th 2010.
4. “Some Parametrizations of States, Gates and Channels”, presented at the *Quantum Computing Week* at the George Washington University, March 23rd, 2010, Washington DC.
5. “Quantum Information Theory”, presented at the Math Club weekly meeting, University of Texas at Dallas, March 25th 2010.
6. “Unit Cell- Synthesis”, presented at the “PhASER PI Review Meeting” (DARPA/MTO contractors meeting), April 1st 2010, Orlando, FL.
7. “On a Parametrization of the Symplectic Group with Applications to Quantum Control”, presented on March 3rd, 2009 during the IMA Annual Program Year Workshop on “Coherence, Control and Dissipation”, March 2nd-6th, 2009 at the Institute of Mathematics and Applications (IMA), University of Minnesota, Minneapolis, MN.
8. “Controllability of Quantum Systems”, presented during the *Quantum Chaos, Quantum Computing and Quantum Control Section of the Mathematical Horizons in Quantum Physics Workshop*, at the Institute of Mathematical Sciences, National University of Singapore, August 5th, 2008.
9. “Parametrizations of Positive Matrices with Applications to Quantum Information Processing” in the NSF sponsored Conference on Mathematics of Quantum Computation & Quantum Technology, Nov 13th - 16th, 2005, College Station, Texas A& M University.
10. “Parametrizing Orthogonal and Other Structured Matrices in Dimension Four”, in the *Reflection Coefficients: Theory & Applications Workshop*, September 22nd, 2004, Mathematical Sciences Dept, UTD.
11. “Several Explicit Two Qubit Evolutions”, Viswanath Ramakrishna & H. Zhou, invited for the Special Session on *Future Directions in Mathematical Systems and Control Theory II*, at the Regional Meeting of the *American Mathematical Society*, Lubbock, TX, April 9th 2005.
12. “Novel Parametrizations of Quantum States & Channels”, in the Conference on Modern Problems of Theoretical & Mathematical Physics, organized by UNESCO Regional Bureau for Science in Europe, Georgian Academy of Sciences & Tbilisi State University, Georgia, September 2004 (Note: I was unable to attend due to the elaborate visa requirements of the Georgian consulate).
13. “Some Parametrizations of Mixed Quantum States Motivated by Quantum Information”, Workshop on Lagrangian & Hamiltonian Methods in Nonlinear Control (IFAC), Seville, Spain, April 2003.
14. “Control of Two Spin Systems Without Neglecting J-Coupling”, presented at the Quantum Computing Seminar, Texas A & M University, College Station, TX, November 13th 2002.
15. “Controllability of Quantum Systems: Theoretical and Constructive”, presented in Workshop on *Quantum Control: Mathematical and Numerical Challenges*, organized by the Centre de Recherches Mathématique of Université de Montréal, Montreal, Canada, October 6th - October 11th, 2002.
16. “Perspectives on Quantum Control From Atomic and Molecular Control”, presented in the Quantum Control Workshop, organized by MIT, Nuclear Engineering Department (workshop supported by DARPA), October 16th, 2002, Cambridge, MA.

17. "Controllability of a Pair of Coupled Quantum Dots", presented in the *Mathematical Theory of Networks and Systems Conference*, August 2002, Notre Dame, IN.
18. "Control of Quantum Mechanical Processes: Models, Techniques and Practice", presented in the *Special Session on Stabilization and optimal Control of Dynamical Systems* during the *Fourth International Conference on Dynamical Systems and Differential Equations*, May 24th-27th 2002, University of North Carolina, Wilmington.
19. "Non-Unitary Models in Quantum Control", presented by Dr. R. Kosut on my behalf the *IEEE Conference on Decision and Control*, December 2002, Las Vegas, NV.
20. "Constructive Control of a Spin System Via Periodic Controls" in the 40th IEEE Conference on Decision and Control, Orlando, December 2001.
 "Control of Some Quantum Systems - The Role of Phases", in the International Federation of Automatic Control's Nonlinear Controls Symposium (NOLCOS 2001), St. Petersburg, Russia, July 2001.
21. "Constructive Techniques for the Control of Finite Dimensional Quantum Systems With Amplitude Bounds", in the SIAM Conference on Control and its Applications, San Diego, July 2001.
22. "Controllability and Control Techniques for Quantum Systems", in the II International Workshop on Optimal Control of Quantum Dynamics - Theory and Experiment, organized by the Max-Planck Institute for Quantum Optics, held in Ringberg Castle, December 2001.
23. "Path Planning for Systems with Drift, Motivated by and Applied to Quantum Control", to be given on Dec 2000, CDC Conference, Sydney, Australia.
24. "Path Planning for Systems With Drift on Compact Lie Groups:", UTD Mathematical Sciences Colloquium Talk, April 2000.
25. "Control of Quantum Mechanical Processes", University of Dallas, November 12th 1999.
26. "Accounting for Singularities in Design - Results from a Decoupling Perspective", Invited Talk, December 8th 1999, in the 38th IEEE Control and Decision Conference, Phoenix, Arizona.
27. "Constructive Generation of States in Quantum Control", Mathematical Theory of Networks and Systems, Padova, Italy, July 6th 1998.
28. "The Relevance of the DDP for Nonlinear Control Problems", talk at Texas Systems Day, November 1998, Texas Tech University, Lubbock, TX
29. "Singular Partial Differential Equations Motivated by and Applied to Control Theory", American Mathematical Society Summer Institute on *Differential Geometry and Control*, June 30th 1997, Boulder, Colorado.
30. "Disturbance Rejection Via Measurements for Nonlinear Systems", V. Ramakrishna, *The NSF Workshop on Nonlinear Control*, St. Louis, May 1992.
31. "Control Applications in Chemical Physics", II Mexican School on Gravitation and Mathematical Physics, December 6th 1996, Tlaxcala, Mexico, 35th Annivesary of Cinvestav.
32. "Control and Optimization Applications to Photochemistry", Local Chapter of the IEEE Control Systems Society, Dallas, TX, January 14th 1997.
33. "Control of Molecular Dynamics", 37th IFIP (International Federation of Information Processing) Conference, July 25th 1997, Detroit, Michigan.

34. "Control Theory for Quantum Computing", H. Rabitz and V. Ramakishna (talk presented by H. Rabitz), ARO-NSA Contractors Meeting, Bowie, Maryland, July 12th, 1996.
35. "Singular Systems of Overdetermined I Order PDEs", Department of Mathematics, Southern Methodist University, Dallas, January 1996.
36. "Composition and Division Theorems and Controlled Decomposition", 34th IEEE CDC, December 1995, New Orleans.
37. "Achieving Decomposition Via Feedback in Nonlinear Systems", Karcher Visiting Fellow Lecture, Department of Mathematics, University of Oklahoma, Norman, November 1995.
38. "Poincaré's Lemma with Parameters and its Applications to Nonlinear Control", V. Ramakrishna, Department of Mathematics,
39. "From Disturbance Rejection to Semiconductor Heterostructures - Applications of Foliations with Singularities", V. Ramakrishna, Control and Dynamical Systems Option, *California Institute of Technology*, Pasadena, CA, July 1994.
40. "Novel Control Problems Arising in Molecular Dynamics", *SIAM Annual Conference*, San Diego, CA, July 1994.
41. "Controlled Invariant Singular Foliations - Additional Results", V. Ramakrishna, *The 32nd, IEEE Control and Decision Conference*, San Antonio, TX, December 1993.
42. "Regularity Conditions in Nonlinear Control", V. Ramakrishna, *Washington University*, November, 1993.
43. "Sensors, Actuators and Control - An Overview", V. Ramakrishna, *Princeton University*, Princeton, NJ, July 1993.
44. "Controlled Invariance for Singular Distributions - The Smooth Case", V. Ramakrishna, *The 31st, IEEE Control and Decision Conference*, Tucson, AZ, December 1992.
45. "Controllability of Bilinear Systems with Applications to Laser Controlled Chemistry", V. Ramakrishna, *Princeton University*, Princeton, NJ, August 1992.
46. "The Partial Differential Equations of Controlled Invariance", V. Ramakrishna, *Computation and Control III*, Bozeman, MT, August 1992.
47. "Symmetries and Singularities in the Control of Nonlinear Systems", V. Ramakrishna, Department of Mathematics, *Iowa State University*, Ames, IA, February 1991.
48. "Symmetries and Singularities in the Control of Nonlinear Systems", V. Ramakrishna, Department of Mathematics, *The University of Notre Dame*, Notre Dame, IN, January 1991.

g) Contributed Conference Presentations

Note: Some of the talks listed below were based on the acceptance of refereed papers or abstract submitted to the conference. These are indicated as "*Refereed Presentation*".

1. "The Relevance of the DDP for Nonlinear Control Problems", talk at Texas Systems Day, November 1998, Texas Tech University, Lubbock, TX
2. "Intermediate Integrals for Degenerate Equations", September 1998 Colloquium Talk, Program in Mathematical Sciences, University of Texas At Dallas, Richardson, Texas.

3. “Robust Decoupling for Nonlinear Systems”, Texas Systems Day, Southern Methodist University, Dallas, Texas, October 1996.
4. “Group Invariant Solutions to Equations of the Hamilton-Jacobi Type” CISS 1994, March 1994, Princeton, New Jersey. (Refereed Presentation)
5. “Remarks on Robust Disturbance Decoupling of Nonlinear Systems”, IEEE Control and Decision Conference 1992, December 1992, Tucson, Arizona. (Refereed Presentation - paper did not appear in Proceedings since publishers claims that the manuscript was not received in time. The talk is listed in the table of contents of the proceedings.) Illinois (Refereed Presentation)
6. “Nonlinear Design Problems Despite the Non-existence of Relative Degree at Isolated Points”, III SIAM Conference on Control and Its Applications, April 27th, 1995, St. Louis.
7. “Symmetry in Nonlinear Design, First SIAM Conference on Linear Algebra and Applications, November 1990, San Francisco, California.

Funding:

1. “The Three Pillars of Mathematics Via Engineering”, V. Ramarishna (PI), M. Dabkowski, W. Krawcewicz, submitted to the STEM-Talent Expansion Program (subcontract of a NSF grant with R. Hilborn as the PI), for \$10,000 (accepted in January 2011).
2. “Fabrication, Test and Evaluation of an Active Lattice Filter Unit Cell For Photonic Analog Signal Processing Engines with Reconfigurability (PHASER)”, 2008, DARPA, \$1.75 Million, Joint Proposal Of UTD, SMU and Photodigm. UTD Team: D. MacFarlane (Co-PI), L. R. Hunt (Senior Personnel), J. Kim (Senior Personnel), V. Ramakrishna (Senior Personnel).
3. “Photonic Integrated Circuit for Quantum Encryption”, D. MacFarlane (PI), V. Ramakrishna (Senior Personnel), Louis Hunt (Senior Personnel); Tiberiu Constantinescu (Senior Personnel), AFOSR/Photdigm, \$ 31,332 2005- 2006.
4. “Workshop on Knots and Quantum Computation”, M. Dabkowski, J. Przytycki and V. Ramakrishna PIs, NSF, DMS-0745204, \$ 25, 000, August 2007-August 2009.
5. “Groups and Singularities in Quantum Control and Nonlinear Design”, Viswanath Ramakrishna, NSF, \$60,999, September 2000-August 2004 (with one year no cost extension)
6. “Protocols For Creating Quantum Gates and Circuits”, ARO-NSA (subcontract via Princeton University) - H. Rabitz and V. Ramakrishna - \$ 37,500 for UTD, 1996-1998.
7. Several Other Travel Grants and UTD Research Enhancement Grants.

Sample Courses Taught: Multivariable Calculus, Ordinary Differential Equations, Linear Algebra, Topology, Abstract Algebra, Quantum Information, One Variable Calculus (outside UTD), Engineering Mathematics, Real Analysis, Complex Analysis, Stochastic Calculus for Finance, Nonlinear Control

Theory, Mathematics of Signal Processing.

Thesis Advising: 5 Ph.d students and several undergraduate honours theses.

Sample Service Contributions:

Service External to UTD:

1. Editor of Special Issue of *Journal of Knot Theory With Its Ramifications*, June 2010 and January 2011 (the latter issue is yet to appear).
2. Co-organizer (with M. Dabkowski and J. Przytycki) of the NSF sponsored “Workshop on Knot Theory and Quantum Computing”, UT Dallas, December 2007.
3. Referee for several journals including *J of Mathematical Analysis and Applications*, *IEEE Transactions on Automatic Control*, *Systems-Control Letters*, *IEEE Control and Decision Conference*.

Service at UTD:

NB: I have served on several committees. The list below is only a partial list.

1. Associate Program Head, Dept of Mathematical Sciences, Fall 2008 to Fall 2009.
2. Member, Committee on Qualifications, 2005-2008.
3. Member, EEF and Dean’s Scholarship Committee, School of NS&M, Fall 2009 to date.
4. *Graduate Advisor for Mathematics, Engineering Mathematics and Applied Mathematics*, Fall 2005 to Fall 2010.
5. *Undergraduate Advisor for Mathematics and Applied Mathematics*, Spring 2004 to Fall 2005 (note this appointment began in Fall 1999. I am including only the period relevant to this review).
6. Chairman, Qualifying Examination Committee, Dept of Mathematical Sciences, Fall 2004 to date.
7. Chairman, Undergraduate Curriculum Committee, Dept of Mathematical Sciences, Fall 2004.
8. Member, Planning Committee, Dept of Mathematical Sciences, Fall 2005 - Spring 2006.
9. Member, III Year Review Committee for Dr. P. Choudhary, Fall 2004-Spring 2005.
10. Member, Promotion to Professor Committee for Dr. M. Baron, Fall 2005 - Spring 2006.
11. Chair, III Year Review Committee for Dr. M. Dabkowski, Fall 2005 - Spring 2006.
12. Member, Promotion to Associate Professor with Tenure for Dr. P. Choudhary, Fall 2007-Spring 2008.
13. Chair, Committee for Promotion to Associate Professor with Tenure for Dr. M. Dabkowski, Fall 2008-Spring 2009.
14. Member, III Year Review Committee for Dr. Y. Cao, Fall 2008-Spring 2009.

15. Chair, III Year Review Committee for Dr. T. Hagge, Fall 2010-to date.
16. Chair, Academic Search 2076, Dept of Mathematical Sciences, Fall 2005-Spring 2006.
17. Chair, Academic Search 2084, Dept of Mathematical Sciences, Fall 2006-Spring 2007.
18. Chair, Applied Mathematics Academic Search Committee, Fall 2007- Spring 2008.
19. Member, Search Committee for Chairman for Mathematical Sciences Department, Fall 2008-Spring 2009.
20. External Chair for Ph. D Oral Defense for several students.
21. Member, Ph. D Committee for several students.
22. Second Reader for Several Undergraduate Honors Theses.