

SHORT BIOGRAPHY OF GOONG CHEN

Goong Chen was born in Kaohsiung, Taiwan in 1950. He received his BSc (Math) from the National Tsing Hua University in Hsinchu, Taiwan in 1972 and PhD (Math) from the University of Wisconsin at Madison in 1977. He has taught at the Southern Illinois University at Carbondale (1977–78), and the Pennsylvania State University at University Park (1978–1987). Since 1987, he has been Professor of Mathematics and Aerospace Engineering, and (since 2000) a member of the Institute for Quantum Studies, at Texas A&M University in College Station, Texas. He has also held visiting positions at INRIA in Rocquencourt, France, Centre de Recherche Mathématiques of the Université de Montréal, the Technical University of Denmark in Lyngby, Denmark, the National University of Singapore, and National Tsing Hua University in Hsinchu, Taiwan.

He has research interests in many areas of applied and computational mathematics: control theory for partial differential equations (PDEs), boundary element methods and numerical solutions of PDEs, engineering mechanics, chaotic dynamics, quantum computation, chemical physics and quantum mechanics. He has written over one hundred and thirty papers, five advanced texts/monographs, and co-edited four books. He is Editor-in-Chief of the Chapman & Hall/CRC Press Applied Mathematics and Nonlinear Science Series, and Journal of Mathematical Analysis and Applications, and has served on several other editorial boards, including the SIAM Journal on Control and Optimization, the International Journal on Quantum Information, and the Electronic Journal of Differential Equations. He is also a co-holder of a U.S. Patent on certain quantum circuit design for quantum computing. He has memberships in the American Mathematical Society (AMS) and the Society for Industrial and Applied Mathematics (SIAM). His recent book, “Quantum Computing Devices: Principles, Designs and Analysis,” 542 pages, coauthored with several physicists, was recently published by Chapman & Hall/CRC Press (Taylor and Francis) in October 2006.

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CITIZENSHIP

Naturalized U. S. (6/23/1982)

ACADEMIC

College	National Tsing-Hua University, Hsinchu, Taiwan, Republic of China, September 1968-June 1972
Graduate School	University of Wisconsin Madison, Wisconsin 1974-1977 Ph.D. (Math) awarded May, 1977

IN THE PROFESSION

July 1972-May 1974	Civil Engineering Supervisor, ROTC Chinese Navy
September 1974-May 1976	Teaching Assistant, University of Wisconsin Madison, Wisconsin
June 1976-May 1977	Wisconsin Alumni Research Foundation Fellow, University of Wisconsin
July 1977-August 1977	Research Associate, University of Wisconsin
August 1977-May 1978	Assistant professor, Department of Mathematics, Southern Illinois University at Carbondale, Illinois
February 1979-May 1979	Visiting Lecturer, Institut de Recherche d'Informatique et d'Automatique (IRIA), Rocquencourt, France
June 1978-June 1982	Assistant Professor, Department of Mathematics, The Pennsylvania State University, University Park, Pennsylvania
August 1982	Invited Scientist, Institute for Computer Applications in Science and Engineering (ICASE), NASA Langley Center, Hampton, Virginia
July 1982-August 1987	Associate Professor, Department of Mathematics, The Pennsylvania State University, University Park, Pennsylvania
July 1982-August 1987	Adjunct Professor, Computational Fluid Dynamics Studies, The Pennsylvania State University, University Park, Pennsylvania
January 1983-December 1983	Consultant, ICASE, NASA Langley Research Center, Hampton, Virginia
July 1983	Invited Professor, Centre de Recherche de Mathematiques Appliques, Université de Montréal, Montréal, Quebec, Canada
June 1987-present	Professor of Mathematics and Aerospace Engineering, Texas A&M University, College Station, Texas
July-August, 1990	Invited Professor, Institute of Applied Mathematics, National Tsing Hua University, Hsinchu, Taiwan
August 2-16, 1993	Invited Professor, Mathematical Institute, The Technical University of Denmark,

	Lyngby, Denmark
January-December, 1994	Visiting Professor Institute of Applied Mathematics National Tsing Hua University Hsinchu, Taiwan, Rep. of China
August 1998	Invited Professor Center for Theoretical Science National Research Council Hsinchu, Taiwan
December 11-20, 2003	Invited Professor Department of Physics National University of Singapore Singapore
Fall Semester 2006	Invited Professor National Center for Theoretical Sciences Tsing Hua University Hsinchu, Taiwan
March 2007	Invited Professor Institute of Mathematics Academia Sinica Taipei, Taiwan
July 2007	Invited Professor Taida Institute for Mathematical Sciences National Taiwan University Taipei, Taiwan
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PROFESSIONAL SOCIETY

American Mathematical Society (AMS)
Society for Industrial and Applied Mathematics (SIAM)

EDITORSHIPS

Associate Editor, SIAM Journal on Control and Optimization, January 1992 -
December 1997
Editorial Board, Electronic Journal of Differential Equations, August 1997 - present
Associate Editor, J. Math. Anal. Appl. (JMAA), October 2001 - June 2006
Editor-in-Chief, Journal of Mathematical Analysis and Applications (JMAA), July 2006 -

present.

Editor-in-Chief, Applied Mathematics and Nonlinear Science Series, Chapman & Hall/CRC Press, Boca Raton, Florida, April 2002 - present

Editorial Board, Int. J. of Quantum Information (World Scientific, Singapore), September 2002 - present.

RESEARCH INTERESTS

Chaotic vibrations in nonlinear partial differential equations, numerical methods for partial differential equations, control systems governed by partial differential equations, molecular quantum mechanics, quantum computation.

PUBLICATIONS

1. A note on uniform distributions (number Theory), Bulletin of the Institute of Mathematics, Academia Sinica, 1 (1973), 229–238.
2. Energy decay estimates and control theory for the wave equation in a bounded domain, Proc. of the 15th Annual Allerton Conference on Communication, Control and Computing, Urbana, Illinois, (1977), 496–502.
3. Control and stabilization for the wave equation in a bounded domain, SIAM J. Control Opt., 19 (1979), 66–81.
4. Energy decay estimates and exact boundary value controllability for the wave equation in a bounded domain, J. Math. Pure Appl., 58 (1979), 249–273.
5. Well-posedness and approximations of linear Volterra integrodifferential equations in Banach spaces, in “Volterra Equations”, Helsinki Symposium on Integral Equations, Springer Lecture Notes, #737 (1979), 83–87 (with R. Grimmer).
6. Control Theory for the wave equation in compact Riemannian manifolds, Funkcialaj Ekvacioj, 23 (1980), 39–61 (with R.S. Millman).
7. Penalization and regularization of quadratic cost controllability problems in a finite dimensional space, Institut National de Recherche d’Informatique et d’Automatique Research Report #10, Rocquencourt, France, March 1980 (with W.H. Mills).
8. Semigroups and integral equations, J. of Integral Equations, 2 (1980), 133–154 (with R. Grimmer).
9. Control and stabilization for the wave equation in a bounded domain, part II, SIAM J. Control Opt., 19 (1981), 114–122.
10. Control and stabilization for the wave equation, part III, domain with moving boundary, SIAM J. Control Opt., 19 (1981), 123–138 (with C. Bardos).
11. A note on the boundary stabilization of the wave equation, SIAM J. Control Opt., 19 (1981), 106–113.

12. Exact controllability theorems and numerical simulations for some nonlinear differential equations, *SIAM J. Control Opt.*, 19 (1981), 744–764 (with W.H. Mills, G. Crosta).
13. Finite elements and terminal penalization for quadratic cost optimal control problems governed by ordinary differential equations, *SIAM J. Control Opt.*, 19 (1981), 765–790 (with W.H. Mills).
14. A mathematical model for linear elastic systems with structural damping, *Math. Res. Center Technical Summary Report #2089*, Univ. of Wisconsin- Madison, June 1980, *Quart. Appl. Math.*, 39 (1981-82), 433-454 (with D.L. Russell).
15. Asymptotic expansion of a penalty method for computing a regulator problem governed by Volterra equations, in “Proceedings of Volterra and Functional Differential Equations”, 217–231, Marcel-Dekker, New York, 1982 (with R. Grimmer).
16. Integral equations as evolution equations, *Control Theory Centre, Res. Report #92*, University of Warwick, Coventry, England, Jan. 1981, *J. Diff. Equations*, 45 (1982), 53–74 (with R. Grimmer).
17. Sharp error estimates for a finite element-penalty approach to a class of regulator problems (with W.H. Mills, S. Sun, D.A. Yost), *Math. Comp.*, 40 (1983), 151–173.
18. Finite difference numerical methods for boundary control systems governed by hyperbolic partial differential equations, in *Proceeding of NASA/JPL Workshop on the Applications of Distributed System Theory to the Control of Large Space Structures*, pp. 477–495. G. Rodriguez ed., JPL Publ. #83-46, Pasadena, Calif., July 1983 (with Q. Zheng, M. Coleman and S. Weerakoon).
19. Well-posedness, control and computation for a one-phase Stefan problem with Neumann condition (with S. Sun, Q. Zheng), *Proc. Roy. Soc. Edinburgh*, 98A (1984), 105–148.
20. Optimal boundary impedance for the minimization of reflection (I): asymptotic solutions by the geometrical optics method, *Optimal Control Applications & Methods*, 6 (1985), 141–149.
21. N -person differential games, part I, a new minimax formulation and complete open loop solutions, *Proc. Roy. Soc. Edinburgh*, A 103 (1986), 15–34 (with Q. Zheng, J.X. Zhou).
22. Modeling, stabilization and control of serially connected beams, (with M.C. Delfour, A.M. Krall and G. Payre), *SIAM J. Control Opt.*, 25 (1987), 526–546.
23. An initial value problem for the Burgers equation. *The 2nd International Conference on Control Theory for Distributed Parameter Systems and Applications*, Vorau, Austria, July 1984, *Springer Lecture Notes in Control and Information Sciences*, Vol. 75 (1985), 52–76 (with S. Weerakoon, H.K. Wang).

24. Uniform exponential stabilization of coupled Euler-Bernoulli beams, The 23rd IEEE-CDC Proceedings, 1159–1162, Las Vegas, Nevada, Dec. 1984 (with M.C. Delfour, A.M. Krall).
25. Minimizing the reflection of electromagnetic waves by surface impedance, Math. Res. Center Technical Summary Report #2942, Univ. of Wisconsin, Madison, July 1986. Wave Motion, 9 (1987), 19–36 (with T.J. Bridges, G. Crosta).
26. The boundary element numerical method for two dimensional linear quadratic elliptic problems: (I) Neumann control, Math. Comp., 49 (1987), 479–498 (with Y.L. Tsai).
27. Pointwise stabilization in the middle of the span for second order systems, nonuniform and uniform decay results, SIAM J. Appl. Math., 47 (1987), 751–780 (with M. Coleman, H.H. West).
28. Diagonal convexity conditions for problems in convex analysis and quasi-variational inequalities, J. Math. Anal. Appl., 132 (1988), 213–225 (with J. Zhou).
29. A boundary element method based on Cauchy integrals for some linear quadratic boundary control problems on a circle, Optimal Control Applications & Methods, 9 (1988), 93–100 (with C.P. Chen, I. Aronov).
30. The Euler-Bernoulli beam equation with boundary energy dissipation, “Operator Methods for Optimal Control Problems,” S.J. Lee ed., Lecture Notes in Pure and Applied Mathematics Series, pp. 67–96 Marcel Dekker Inc., New York (with S.G. Krantz, D.W. Ma, C.E. Wayne, H.H. West).
31. Pointwise stabilization for coupled quasilinear and linear wave equations, presented at the Conference on Control and Identification of Distributed Systems, Vorau, Austria, Springer Lecture Notes on Control and Information Sciences, #102 (1987), 40–63 (with H.K. Wang).
32. Asymptotic behavior of solutions of the one-dimensional wave equations with a nonlinear elastic dissipative boundary condition, SIAM J. Control Opt., 27 (1989), 758–775 (with H.K. Wang).
33. Minimizing the reflection of waves by surface impedance using boundary elements and global optimization, Wave Motion, 10 (1988), 239–255 (with T.J. Bridges, J. Zhou).
34. Analysis, designs and behavior of dissipative joints for coupled beams, SIAM J. Appl. Math., 49 (1989), 1665–1693 (with S.G. Krantz, D.L. Russell, C.E. Wayne, H.H. West, M.P. Coleman).
35. Computing optimal boundary controls of a plate by the boundary element method, Proceedings of the 26th IEEE Control and Decision Conference, 992–996, Los Angeles, December 1987 (with J. Zhou).

36. Modelling, analysis and testing of dissipative beam joints - experiments and data smoothing, presented at the 6th International Conference on Mathematical Modelling, Washington Univ., St. Louis, MO, August 1987. *Mathl. Comput. Modelling*, 11 (1988), 1011–1016, Pergamon Press, New York, 1988 (with S.G. Krantz, D.L. Russell, C.E. Wayne, H.H. West, J. Zhou).
37. Shock structure in jets of arbitrary exit geometry, AIAA paper 87-2697, AIAA 11th Aeroacoustics Conference, Oct. 19-21, 1987, Palo Alto, California. Full length paper *J. Sound & Vibration*, 132 (1989), 199–211 (with P.J. Morris and T.R.S. Bhat).
38. Exponential stability analysis of a long chain of coupled vibrating strings with dissipative linkage, *SIAM J. Appl. Math.*, 49 (1989), 1694–1707 (with K.S. Liu, F.L. Huang).
39. Theory, designs and applications of point stabilizers for dynamic structures, presented at the COM-CON Workshop on the Stabilization of Large Flexible Space Structures, Montpellier, France, December 1987. Workshop Proceedings, pp. 117–143, Optimization Software, Inc., New York, 1989.
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42. The wave propagation method for the analysis of boundary stabilization in vibrating structures, *SIAM J. Appl. Math.*, 50 (1990), 1254–1283 (with J. Zhou).
43. Asymptotic locations of eigenfrequencies of vibration of an Euler-Bernoulli beam with nonhomogeneous structural and viscous damping coefficients, *SIAM J. Control Opt.*, 29 (1991), 347–367 (with H.K. Wang).
44. The boundary element method for shape control of distributed parameter elastic systems, “Mechanics and Control of Space Structures”, AIAA Progress in Aeronautics and Astronautics Series, 315–348, J.L. Junkins ed., AIAA, Washington, D.C., 1990 (with J. Zhou).
45. Analysis of vibrating eigenfrequencies of a thin plate by Keller-Rubinow’s wave method (I), *SIAM J. Appl. Math.*, 51 (1991), 967–983 (with M. P. Coleman, J. Zhou).
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47. More boundary dissipation does not necessarily imply larger asymptotic decay rates, *Asymptotic Analysis*, 6 (1992), 191–203 (with F.L. Huang, C.Y. Lin).
48. Augmenting a Fredholm operator of zero index to achieve invertibility for elliptic boundary value problems, *J. Math. Anal. Appl.*, 176 (1993), 24–48 (with S. Sun).

49. Some boundary control problems and computations for the linear elastostatic Kirchhoff plate on an exterior domain, in “Boundary control and variations”, Proc. of IFIP Workshop, J.P. Zolesio ed., Springer-Verlag Lecture Notes on Control and Information Science #178, pp. 82–117, Springer-Verlag, New York, 1992.
50. The wave method for determining the asymptotic damping rates of eigenmodes I: The wave equation on a rectangular or circular domain, *SIAM J. Control Opt.*, 29 (1991), 656–677 (with J. Zhou).
51. Boundary Element Methods for Elliptic Boundary Value Problems, Lecture Notes published by the Institute of Applied Mathematics, National Tsing Hua University, Hsinchu, Taiwan, June 1991 (169 pages).
52. On the equivalence of the wave propagation method and Bolotin’s method for the eigenfrequencies of a vibrating thin plate, *Wave Motion*, 16 (1992), 285–297 (with M.P. Coleman and J. Zhou).
53. Visualization of special eigenmode shapes of a vibrating elliptical membrane, *SIAM Review*, 36 (1994), 453–469 (with P.J. Morris and J. Zhou).
54. Instability waves in supersonic jets confined in circular and noncircular ducts, *J. Sound & Vibration*, 171(2) (1994), 231–253 (with K. Viswanathan and P. J. Morris).
55. Point observation in linear-quadratic elliptic distributed control systems, in Proceedings of American Mathematical Society Summer Conference on Control and Identification of Partial Differential Equations, H.T. Banks, R. Fabiano and K. Ito ed., Chap. 11, pp. 155–170, SIAM, Philadelphia, 1993 (with L. Ji).
56. Boundary element method for shape (domain) optimization of linear-quadratic elliptic boundary control problems, in Proceedings of IFIP, June 1992, Sophia-Antipolis, France, Springer-Verlag Lecture Notes on Control and Information Sciences, J.P. Zolesio ed. Lecture Notes in Pure and Appl. Math., #163 (1994), 27–72 (with J. Zhou and R. McLean).
57. N -person differential games, Part II, *J. Computational Mathematics*, 6 (1992), 303–320 (with Q. Zheng).
58. N -person differential games, Part III, *J. Computational Mathematics*, 6 (1992), 321–338 (with Q. Zheng, W.H. Mills and W.H. Shaw).
59. Regularities and pseudodifferential symbols of boundary layer operators for elastostatic thin Kirchhoff biharmonic plates, in “Proc. of the Workshop on Differential Equations (III)”, Institute of Math., Academia Sinica, Taipei, Taiwan, (1995), 21–47.
60. Boundary element monotone iteration scheme for semilinear elliptic partial differential equations. *Math. Comp.*, 65 (1996), 943–982 (with Y. Deng, W.M. Ni and J. Zhou).

61. Linear superposition of chaotic and orderly vibrations on two serially connected strings with a van der Pol joint, *Int. J. Bifurcation & Chaos* 6 (1996), 1509–1527 (with S.B. Hsu and J. Zhou).
62. Improving low order eigenfrequency estimates derived from the wave propagation method for an Euler-Bernoulli beam, *J. Sound & Vibration* 204 (1997), 696–704 (with M.P. Coleman).
63. Chaotic vibrations of the one-dimensional wave equation subject to a self-excitation boundary condition, Part I, *Transactions Amer. Math. Soc.* 350 (1998), 4265–4311 (with S.B. Hsu and J. Zhou).
64. Some corner effects on the loss of selfadjointness and nonexcitation of vibration in thin plates and shells, *Quart. J. Mech. Appl. Math.* 51 (1998), 213–239 (with M.P. Coleman and Z. Ding).
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66. The fundamental solution of the shallow circular cylindrical shell, Part I, derivations, *Int. J. Engineering Sci.* 38 (2000), 1235–1257 (with M.P. Coleman, D. Ma, P.J. Morris and P. You).
67. The fundamental solution of the shallow circular cylindrical shell, Part II, numerical algorithms and software, *Int. J. Engineering Sci.* 38 (2000), 1259–1274 (with M.P. Coleman and P. You).
68. Boundary element monotone iteration scheme for semilinear elliptic equations, Part II, coupled 2×2 systems and visualization, *Math. Comp.* 69 (1999), 629–652 (with Y. Deng, W.M. Ni and J. Zhou).
69. Asymptotic equipartition of energy by nodal points of an eigenfunction, *J. Math. Phys.* 38 (1997), 5350–5360 (with S.A. Fulling and J. Zhou).
70. Some phenomena in mechanical vibrations and the associated mathematical properties (in Chinese), *Mathmedia*, 20(2) (1996), Academia Sinica, Taipei, Taiwan, 3–25.
71. Chaotic vibrations of the one-dimensional wave equation due to a self-excitation boundary condition, Part II, energy injection, period doubling and homoclinic orbits, *Int. J. Bifurcation & Chaos* 8 (1998), 423–445 (with S.B. Hsu and J. Zhou).
72. *Ibid*, Part III, natural hysteresis memory effects, *Int. J. Bifurcation & Chaos* 8 (1998), 447–470 (with S.B. Hsu and J. Zhou).
73. A high-linking algorithm for sign-changing solutions of semilinear elliptic equations, *Nonlinear Analysis, Theory, Methods & Applications* 38 (1999), 151–172 (with Z. Ding and D. Costa).

74. Algorithms and visualization for solutions of nonlinear elliptic equations, *Int. J. Bifurcation & Chaos* 7 (2000), 1565–1612 (with W.M. Ni and J. Zhou).
75. Snapback repellers as a cause of chaotic vibration of the wave equation due to a van der Pol boundary condition and energy injection in the middle of the span, *J. Math. Phys.* 39 (1998), 6459–6489 (with S.B. Hsu and J. Zhou).
76. Nonisotropic spatiotemporal chaotic vibration of the wave equation due to mixing energy transport and a van der Pol boundary condition, *Int. J. Bifurcation & Chaos* 12 (2002), 535–559 (with S.B. Hsu and J. Zhou).
77. Chaotic vibration of the wave equation by nonlinear feedback boundary control, Chapter 7 in “Control of Bifurcation and Chaos in Engineering”, CRC Press, Boca Raton, FL, 1999, 131–154 (with S.B. Hsu and J. Zhou).
78. Boundary element monotone iteration scheme for semilinear elliptic boundary value problems, Part III, Regular oblique derivative nonlinear boundary conditions, submitted (with Y. Deng, W.M. Ni and J. Zhou).
79. Grover’s algorithm for multiobject search in quantum computation, <http://xxx.lanl/quant-ph/9909040> in “*Directions in Quantum Optics*”, H.J. Carmichael, R.J. Glauber and M.O. Scully (eds.), Springer-Verlag, 2000, 165–176.
80. Generalization of Grover’s algorithm to multiobject search in quantum computing, Part I, continuous time and discrete time, in Chap. 6 of “*Mathematics of Quantum Computation*”, R.K. Brylinski and G. Chen (eds.), CRC Press, Boca Raton, Florida, 2002, 135–160 (with S.A. Fulling and J. Chen).
81. Generalization of Grover’s algorithm to multiobject search in quantum computing, Part II, general unitary transformations, in Chap. 7 of “*Mathematics of Quantum Computation*”, R.K. Brylinski and G. Chen (eds.), CRC Press, Boca Raton, Florida, 2002, 161–168 (with S. Sun).
82. Nonlinear boundary feedback control of the one-dimensional wave equation, Proc. of the 39th IEEE Conference on Decision and Control, Dec. 2000, Sydney, Australia, 2060–2065 (with T. Huang and S.B. Hsu).
83. Unbounded growth of total variations of snapshots of the 1D linear wave equation due to the chaotic behavior of iterates of composite nonlinear boundary reflection relations, in *Advances in Control of Nonlinear Distributed Parameter Systems*, G. Chen, I. Lasiecka and J. Zhou (eds.), Marcel Dekker, New York, 2001, 15–42 (with T. Huang, J. Juang, and D. Ma).
84. Algorithms and visualization for solutions of nonlinear elliptic equations, Part II: Dirichlet, Neumann and Robin boundary conditions and problems in 3D, *Int. J. Bifurcation and Chaos*, 11 (2001), 1781–1799 (with W.M. Ni, A. Perronnet, and J. Zhou).

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86. The universality of the quantum Fourier transform in forming the basis of quantum computing algorithms, *J. Math. Anal. Appl.* 274/1 (2002), 69–80 (with C.M. Bowden, Z. Diao, and A. Klappenecker).
87. Quantum circuit design for Grover’s algorithm, *Zeitschrift für Naturforschung* 57a (2002), 701–708 (with Z. Diao and M.S. Zubairy).
88. Generalization of Grover’s algorithm to multiobject search in quantum computing, Part I, continuous time and discrete time, Chapter 6 in “*Mathematics of Quantum Computation*”, R. Brylinski and G. Chen, eds., CRC Press, Boca Raton, FL, 2002, 135–160 (with S.A. Fulling and J. Chen).
89. Analyzing the displacement terms memory effect to prove the chaotic vibration of the wave equation, *Int. J. Bifurcation and Chaos* 12 (2002), 965–981 (with S.B. Hsu and T.W. Huang).
90. Nonisotropic spatiotemporal chaotic vibration of the wave equation due to mixing energy transport and a van der Pol boundary condition, *Int. J. Bifurcation and Chaos* 12 (2002), 535–559 (with S.B. Hsu and J. Zhou) .
91. Generalization of Grover’s algorithm to multiobject search in quantum computing, Part II, general unitary transformations, Chapter 7 in “*Mathematics of Quantum Computation*”, R. Brylinski and G. Chen, eds., CRC Press, Boca Raton, FL, 2002, 161–168 (with S. Sun).
92. Mathematical models of contemporary elementary quantum computing devices, invited book chapter, in “*Quantum Control: Mathematical and Numerical Challenges*”, Centre de Recherches Mathématiques Lecture Notes #33, A. Bandrauk and M.C. Delfour eds., Amer. Math. Soc., Providence, R.I., 2003, 79–118 (with D.A. Church, B.-G. Englert and M.S. Zubairy).
93. Chaotic vibration of the wave equation with nonlinear feedback boundary control: progress and open questions, invited book chapter, in “*Chaos Control*”, Chapter 2, G.R. Chen, X. Yu and D.J. Hill eds., Springer Lecture Notes on Control and Information Sciences, Vol. 292, Springer, Heidelberg, 2003, pp. 25–50 (with S.B. Hsu and J. Zhou).
94. Boundary element monotone iteration scheme for semilinear elliptic equations, regular oblique derivative nonlinear boundary conditions, invited chapter, in “*Variational Methods for Nonlinear Elliptic Partial Differential Equations: Open Problems, Recent Progress and Numerical Algorithms*”, J.M. Neuberger, ed., Amer. Math. Soc. Contemporary Math. 357 (2004), Providence, R.I., 17–48 (with Y. Deng, W.M. Ni and J. Zhou).

95. A note on the elliptic Sine-Gordon equation, invited chapter, in “*Variational Methods for Nonlinear Elliptic Partial Differential Equations: Open Problems, Recent Progress and Numerical Algorithms*”, J.M. Neuberger, ed., Amer. Math. Soc. Contemporary Math. 357 (2004), Providence, R.I., 49–67 (with Z. Ding, C.-R. Hu, W.-M. Ni and J. Zhou).
96. Convergence analysis of an optimal scaling algorithm for semilinear elliptic boundary value problems, invited chapter, in “*Variational Methods for Nonlinear Elliptic Partial Differential Equations: Open Problems, Recent Progress and Numerical Algorithms*”, J.M. Neuberger, ed., Amer. Math. Soc. Contemporary Math. 357 (2004), Providence, R.I., 69–83 (with B.-G. Englert and J. Zhou).
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98. Visualization of solutions of singularly perturbed semilinear boundary value problems, invited book chapter, in “*Handbook of Differential Equations*”, M. Chipot and P. Quittner, eds., Elsevier, Amsterdam, The Netherlands, 2004, pp. 218–228 (with W.-M. Ni, A. Perronnet and J. Zhou).
99. Molecular calculations with simple two-center correlated orbitals, Chem. Physics Letters 389 (2004), 385–392 (with M.O. Scully, R. Allen, K.T. Kapale, M. Kim, and A. Svidzinsky).
100. On positive solutions of the semilinear elliptic sine-Gordon equation, Comm. Pure and Appl. Anal. 4 (2005), 285–296 (with Z. Ding and S. Li).
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102. Traveling wave behavior for a nonlinear reaction-diffusion equation of the generalized Fisher type, Discrete, Continuous and Impulsive Dynamical Systems 12 (2005), 643–664 (with Z. Feng).
103. Solitary wave solutions of the compound Burgers-Korteweg-de Vries equation, Physica A 352 (2005), 419–435 (with Z. Feng).
104. Rapid fluctuations of chaotic maps on \mathbb{R}^N , J. Math. Anal. Appl. 323 (2006), 228–252 (with Y. Huang and D. Ma).
105. Quantum dot computing gates, Int. J. Quantum Information 4 (2006), 233–296 (with Z. Diao, J. Kim, A. Neogi, K. Urtekin and Z. Zhang).
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107. Some fundamental mathematical properties in atomic and molecular quantum mechanics, in “High Dimensional PDEs in Science and Engineering,” A. Bandrauk, M.C. Delfour, and C. Le Bris (eds.), Centre de Recherches Mathématiques (CRM) Proc. Lecture Notes, Vol. 41, pp. 49–72, Université de Montréal, Lecture Notes, Amer. Math. Soc., Providence, R.I., 2007 (with Z. Ding, A. Perronnet, M.O. Scully, R. Xie, and Z. Zhang).
108. A realization scheme for quantum multi-object search, in “Mathematics of Quantum Computation and Quantum Technology,” G. Chen, L. Kauffman, and S. Lomonaco (eds.), Chapman & Hall/CRC Press, (B) pp. 47–65, Boca Raton, Florida (with Z. Diao, and P.J.S. Shiue).
109. Qualitative study of the damped Duffing equation and its applications, *Discrete and Continuous Dynamical Systems (B)* **6** (2006), 1097–1112 (with Z. Feng and S.B. Hsu).
110. Superconducting quantum computing devices, in “Mathematics of Quantum Computation and Quantum Technology,” G. Chen, L. Kauffman, and S. Lomonaco (eds.), Chapman & Hall/CRC Press, pp. 171–221, Boca Raton, Florida, 2007 (with Z. Zhang).
111. Visualization and dimensional scaling for some three-body problems in atomic and molecular quantum mechanics, *J. Math. Phys.* **49** (2008), 062102 (57 pages) (with Z. Ding, A. Perronnet, and Z. Zhang).
112. Max-Min method analysis and algorithms for the computation of the excited states of helium, submitted (with Z. Ding).
113. The spectrum of chaotic time series (I): Fourier analysis, submitted (with S.B. Hsu, Y. Huang and M. Roque-Sol).
114. The spectrum of chaotic time series (II): wavelet analysis, submitted (with S.B. Hsu, Y. Huang and M. Roque-Sol).
115. Stability of Cohen-Grossberg neural networks with unbounded distributed delays, *Chaos, Solitons & Fractals* **34** (2007), 992–996 (with T. Huang and C. Li).
116. Robust three-dimensional spatial soliton clusters in strongly nonlocal media, *J. Phys. B: At. Mol. Opt. Phys.* **41** 025402 (6 pages), 2008 (with W.-P. Zhong, L. Yi, R.-H. Xie, and M. Belić).
117. Collisions of two spatial solitons in inhomogeneous nonlinear media, *Comm. Theo. Phys. (Chinese Phys. Soc.)* **50** (2008), 749–752 (with W.-P. Zhong, L. Yi, Z.-P. Yang, R.-H. Xie, and M. Belić).
118. Exact spatial soliton solutions of the two dimensional generalized nonlinear Schrödinger equation with distributed coefficients, *Phys. Rev. A* **78** (2008), 023821 (6 pages) (with W.-P. Zhong, R.-H. Xie, M. Belić, N. Petrovic and L. Yi).
119. Two-dimensional spatial solitons in nematic liquid crystals, *Comm. Theo. Phys. (Beijing, China)*, **51** (2009), 324–330 (with W.-P. Zhong, L. Yi, R.-H. Xie, and M. Belić).

120. Light bullet solutions to the generalized $(3 + 1)$ -dimensional nonlinear Schrödinger equation, *Phys. Rev. Lett.* **101** (2008), 123904 (4 pages) (with M. Belić, N. Petrovic, W.-P. Zhong and R.-H. Xie).
121. Two-dimensional Whittaker solitons in nonlocal nonlinear media, *Phys. Rev. A* **78** (2008), 013826 (7 pages) (with W-P. Zhong, M. Belić and R-H. Xie).
122. Dynamically compressed bright solitons in a three-dimensional highly anisotropic Bose–Einstein condensate, *Invertis J. Sci. Tech.* **2** (2009), 62–68 (W.-P. Zhong, M. Belić, and R.-H. Xie).
123. NMR quantum computing, in *Advances in Applied Mathematics and Global Optimization*, D.Y. Gao and H.D. Serali (eds.), Springer, Heidelberg, 2008, 465–520 (with Z. Zhang, Z. Diao and P.R. Hemmer).
124. Mathematical formulations of atom trap quantum gates, *Amer. Math. Soc. Contemporary Math.* **482** (2009), 1–22 (with Z. Zhang).
125. Bohr model and dimensional scaling analysis of atoms and molecules, *International Reviews in Physical Chemistry* **27** (2008), 665–723 (with A. Svidzinsky, S. Chin, M. Kim, D. Ma, R. Murawski, A. Sergeev, M.O. Scully and D. Herschbach).
126. Dynamically compressed bright and dark solitons in highly anisotropic Bose–Einstein condensates, *Eur. Phys. J.D.* **55** (2009), 147–153 (with W.-P. Zhong, M. Belić, R.H. Xie, and Y.Q. Lu).
127. Variational justification of the dimensional scaling method in chemical physics: the H -atom, submitted (with Z. Ding, C.-S. Lin, D. Herschbach and M.O. Scully).
128. Extrapolation of elliptic eigenvalue calculations on the whole space by the virial theorem, submitted (with Z. Ding, C.-S. Lin, A. Perronnet, V. Ramakrishna and J. Ward).
129. Quantum computing and devices: a short introduction, to appear in MHQP (Mathematical Horizons in Quantum Physics), Lecture Notes Series of the Institute of Mathematical Science, National University of Singapore, World Scientific, Singapore, 2010 (39 pages).

BOOKS

1. *Boundary Element Methods*, Academic Press Computational Mathematics (Blue) Series, March, Academic Press (London & San Diego), 1992, 646 pages (with J. Zhou).
2. *Vibration and Damping in Distributed Systems, Vol. I: Analysis, Estimation, Attenuation and Design*, CRC Press, Boca Raton, Florida, September 1993, 433 pages (with J. Zhou).
3. *Vibration and Damping in Distributed Systems, Vol. II: WKB and Wave Methods, Visualization and Experimentation*, CRC Press, Boca Raton, Florida, September 1993, 367 pages (with J. Zhou).

4. Linear Stochastic Control Systems, CRC Press, Boca Raton, Florida, July 1995, 400 pages (with G.R. Chen and S.H. Hsu).
5. Quantum Computing Devices: Principles, Designs and Analysis, Chapman & Hall/CRC, Boca Raton, Florida, Sept. 2006, 542 pages (with D.A. Church, B-G. Englert, C. Henkel, B. Rohwedder, M.O. Scully and M.S. Zubairy).

BOOKS EDITED

1. G. Chen, E.B. Lee, W. Littman, and L. Markus, New Trends and Applications of Distributed Parameter Control Systems, Marcel Dekker, New York, November 1990, 516 pages.
2. G. Chen, I. Lasiecka and J. Zhou, Advances in Control of Nonlinear Distributed Parameter Systems, Lecture Notes in Pure & Appl. Math., #218 Marcel Dekker, New York, 2001, 357 pages.
3. R.K. Brylinski and G. Chen, *Mathematics of Quantum Computation*, CRC Press, Boca Raton, FL, April 2002, approx. 420 pages.

AWARD

American Institute for Aeronautics and Astronautics (AIAA) Best Paper Award for the AIAA 12th Aeroacoustics Conference

GRADUATE STUDENTS SUPERVISED

16 Ph.D. theses and 20 master degree projects directed

COURSES TAUGHT

Calculus, differential equations numerical analysis, control theory, partial differential equations, stochastic optimization, linear programming, generalized functions, numerical solutions of partial differential equations, finite element methods, boundary element methods, singular perturbations, pseudodifferential operators, game theory, Hamiltonian systems, dynamical systems and chaos, quantum computation.

PATENT

U.S. patent officially awarded (**#7,028,275**, 4/11/2006) on certain quantum circuit design, jointly with Z. Diao and M.S. Zubairy.

RECENT SHORT COURSES/LECTURE SERIES

- Three 75 minute lectures on “Quantum Search Algorithms”, at the Math. Dept., Pennsylvania State University, invited by Profs. J.L. Brylinski and R.K. Brylinski as a guest lecturer for their graduate course on Quantum Computing, March 2001.

- Six one-hour lectures on “The Mathematical Theory of Quantum Computation”, at the National Center for Theoretical Sciences (NCTS), Hsinchu, Taiwan, July 2001.
- One of three invited principal speakers for an NSF-sponsored conference, entitled “Variational Methods: Open Problems, Recent Progress, and Numerical Algorithms”, three 1-hour lectures, at the Northern Arizona University, Flagstaff, Arizona, June 5-8, 2002. See <http://odin.math.nau.edu/vari>.
- Six one-hour lectures on “The Mathematical Theory of Quantum Computation”, at CRM (Centre de Recherche Mathématiques), Université de Montréal, Quebec, Canada, Aug. 11-16, 2002.
- Three one-hour lectures, entitled “Contemporary Quantum Computing Devices and Their Mathematical Modeling, Part I: cavity QED and ion traps; Part II: quantum dots and NMR; Part III: quantum cellular automata,” in the 2nd Asia-Pacific Workshop on Quantum Information Science, National University of Singapore, Dec. 15-19, 2003.
- Four hours of lectures, entitled “Introduction to Basic Analysis” in the 2004 AMC Summer Camp of Gifted and Talented Mathematics High School Students, located at Chi-Yuan Business Management College in Chia-Yi, Taiwan, July 2004. There were about 150 students in attendance.
- Three hours of lectures “Basic Analysis”, to Summer Camp of Gifted and Talented Mathematics High School Students, at National Cheng-Chi University, Taipei, Taiwan, July 2005. There were 100 students in attendance.
- Two and half hours of tutorial lectures “Introduction to Quantum Mechanics and Quantum Devices”, in the NSF-sponsored conference “Mathematics of Quantum Computation and Quantum Technology”, Dept. of Math., TAMU, Nov. 2005. About 60 people attended.

RESEARCH SUPPORT

June 1979-May 1981, \$18,396

National Science Foundation Grant MCS 78-22830, “Control and stability theory of Maxwell’s equations with applications to electronics”, principal investigator.

June 1981-May 1984, \$111,427

National Science Foundation Grant MCS 81-01892, “Control systems governed by partial differential equations”, co-principal investigator.

June 1984-May 1986, \$46,050

National Science Foundation Grant DMS 84-01297, “Control systems governed by partial differential equations, theory and applications”, principal investigator.

January 1985-June 1985, \$40,000

NSF, NASA and AFOSR, Grant DMS 85-05547, “Workshop on control systems governed by partial differential equations with applications to large flexible structures”, principal investigator.

September 1985-August 1986, \$45,000

September 1986-August 1987, \$57,893

September 1987-August 1988, \$61,987

Air Force Office of Scientific Research Grant 85-0253, “Stabilization and control problems in structural dynamics”, principal investigator.

July 1987-June 1988, \$20,651

National Science Foundation Grant DMS 87-18510, “Computations of optimal controls and designs for distributed systems in optics and elasticity”, principal investigator.

January 1988-December 1988, \$34,384

Air Force Office of Scientific Research Grant 88-0091 “Computations of optimal controls and designs for distributed systems in optics and elasticity”, principal investigator.

September 1988-December 1990, \$183,409

Air Force Office of Scientific Research Grant 87-0334 (renewal), “Stabilization and control problems in structural dynamics”, principal investigator.

January 1, 1991-December 31, 1993, \$253,127

Air Force Office of Scientific Research Grant 91-0097, “Stabilization and control problems in structural dynamics”, principal investigator. (J. Zhou, Co-P.I.)

June 1, 1994-May 31, 1997, \$100,000

NSF Grant DMS 94-04380, “Computation, control, optimization and vibration analysis of shell equations”, (J. Zhou, Co-P.I.)

January 1, 1996-July 31, 1998, \$56,875

Texas Advanced Research Grant, “Chaotic vibrations in mechanical systems governed by partial differential equations”, (J. Zhou, Co-P.I.)

March 1, 1996-February 28, 1998, \$25,000

Texas A&M University Interdisciplinary Research Grant, “Quantification of chaotic vibrations in partial differential equations”, (S. Oliviera, Co-P.I.)

July 1, 1994-June 30, 1997, \$5,100

NATO Travel Grant, NATO, Brussels (M. Pedersen, Co-P.I.)

June 1, 1997-May 31, 1999, \$91,000

NSF Grant DMS 96-10076, “Analysis, control, dynamics and visualization of partial differential equations containing nonlinearities”, (with J. Zhou).

September 1, 1997-August 31, 1998, \$10,000

Texas A&M University College of Science Research Enhancement Grant, (with J. Zhou).

\$12,500

TAMU Interdisciplinary Research Initiative Grant IRI 99-22. (The total grant amount is \$25,000, joint with Prof. V. Kinra of Aerospace Engineering. G. Chen’s portion is \$12,500.)

June 1, 1999-January 31, 2000, \$9,000

NSF Grant DMS 98-15632, “A Conference on Advances in the Control of Nonlinear Distributed Parameter Systems” (with J. Zhou).

June 1999, \$4,500

IMA Grant, “A Conference on Advances in the Control of Nonlinear Distributed Parameter Systems” (with J. Zhou).

June 1999, \$4,000

TAMU College of Science Research Enhancement Grant, “A Conference on Advances in the Control of Nonlinear Distributed Parameter Systems” (with J. Zhou).

June-July 2000, \$2,000

UNDP Grant (from United Nations) to attend the 3rd World Congress on Automation and to visit universities in China.

September 1, 2001-August 31, 2005, \$2,500,000

DARPA Grant, “Spin-Based Lattice-Gas Quantum Computers in Solids Using Optical Addressing”, Co-PI, (I am receiving summer salary from this grant.)

September 1, 2002-August 31, 2005, \$175,000

TAMU Telecommunication Initiative (TITF), “Resilient Quantum Computing”, Co-PI.

2004-2005, \$4,000

IMA PI-Conference, “Mathematical Study of Quantum Computation and Technology” (with Z. Diao).

October 2003

Math. Dept., TAMU, internal proposal for Special Year on Quantum Computation and Technology.

June 2005, \$25,000

NSF Grant DMS 0531131, for conference “Mathematics of Quantum Computation and Quantum Technology”.

TALKS, COLLOQUIA, SEMINARS AND SHORT COURSES SINCE 1992

- Invited talk, 1992 IFIP on “Boundary Control and Boundary Variation”, Ecole des Mines, Sophia-Antipolis, (30 min. talk), June 1992
- Invited talk, AMS-SIAM Summer Conference on Control and Identification of Partial Differential Equations, Mt. Holyoke College, S. Hadley, Massachusetts, (1 hour major talk), July 1992
- 30 minute invited talk in the SIAM Conference on Control in the 90’s Minneapolis, September 1992
- Invited colloquium, Math. Dept., Southern Methodist University, Dallas, January 1993
- One hour technical presentation, Air Force Wright Laboratory, Dayton, Ohio, February 1993
- 25 minute talk in the Texas PDE Conference, College Station, TX, March 1993
- One hour pretalk for Frontiers Lecture Series, Department of Mathematics, Texas A&M University, April 1993
- Invited one-hour seminar, Math. Institute, The Technical Univ. of Denmark, Lyngby, Denmark, August 1993
- One hour talk, Minisymposium on Control of PDEs, Math. Dept., Texas A&M Univ., College Station, TX, October 1993 (G. Chen, Organizer)

- 20 minute talk in AMS Meeting #886, College Station, TX, October 1993 (G. Chen, Organizer)
- One hour pretalk for Frontier Lecture Series, Department of Mathematics, Texas A&M University, October 1993
While on Development Leave during 1/1/94-12/31/94 in Taiwan, I gave one hour invited seminars/colloquia at the following major universities/institutions in Taiwan and China:
- Institute of Math., Academia Sinica, Taipei, Taiwan, January 1994
- Math. Dept., National Taiwan Univ., Taipei, Taiwan, February 1994
- Math. Dept., Chung Cheng Univ., Chia-Yi, Taiwan, March 1994
- Appl. Math. Dept., Sun Yat-Sen Univ., Kaohsiung, Taiwan, March 1994
- Math. Dept., Chang Hwa Normal Univ., Chang Hua, Taiwan, April 1994
- Appl. Math. Dept., Chiao Tung Univ., Hsinghu, Taiwan, May 1994
- Appl. Math. Dept., Sun Yat-Sen Univ., Kaohsiung, Taiwan, March 1994
- Math. Dept., Chang Hwa Normal Univ., Chang Hua, Taiwan, April 1994
- Appl. Math. Dept., Chiao Tung Univ., Hsinchu, Taiwan, May 1994
- Math. Dept., Sichuan Univ., Chengdu, Sichuan, China, August 1994
- Appl. Math. Center, Xian Jiaotong Univ., Xian, China, August 1994
- Math. Dept., Zhongshan Univ., Guangzhou, China, August 1994
- Math. Dept., National Central Univ., Chung Li, Taiwan, October 1994
- Appl. Math. Dept., Chung Hsin Univ., Taichung, Taiwan, November 1994
- Math. Dept., Tunghai Univ., Taichung, Taiwan, November 1994
- National Center for High Performance Computing, Hsinghu, Taiwan, October 1994.
- Invited talk (and session chair), Workshop on Computational Mathematics, Math. Dept., National Taiwan Univ., Taipei, Taiwan, May 1994 (30 minute talk)
- Workshop on Reaction-Diffusion Equation and Other PDEs, Appl. Math. Dept., Chung Cheng Univ., Chia-Yi, Taiwan, September 1994 (2 hour major talk)

The talks I gave in 1995-present are listed below:

- Fifteen minute talk in Texas Finite Element Circus, Texas A&M Univ., College Station, TX, March 1995

- Texas PDE Conference (twenty-five minute talk), Rice Univ., Houston, April 1995 (G. Chen, Session Chair also)
- Thirty minute talk at the SIAM 3rd Conference on Dynamical Systems and Their Applications, Snowbird, Utah, May 1995 (G. Chen, Organizer and Session Chair also)
- Invited one hour departmental colloquium, Math. Dept., Wichita State Univ., Wichita, KS, September 1995
- Invited one-hour departmental seminar, Math. Dept., Univ. of Minnesota, Minneapolis, MN, November 1995
- Invited one-hour departmental colloquium, Math. Dept., Univ. of Nevada-Las Vegas, Las Vegas, NV, November 1995
- Twenty minute talk, Texas PDE Conference, Math. Dept., Southwest Texas State University, San Marcos, Texas, March 1996
- Thirty minute invited talk, Minisymposium “New Advances in Control of PDEs”, SIAM Annual Meeting, Kansas City, Missouri, July 1996
- Thirty minute talk, Army 14th Symposium in Computational Solid Mechanics, Myrtle Beach, South Carolina, October 1996
- A six our invited lecture series at the Math. Dept., Wuhan University, Wuhan, China, December 1996
- Invited one-hour departmental seminar, Math. Dept., Zhongshan University, Guangzhou, China, December 1996
- Invited one-hour departmental seminar, Math. Dept., National Tsing Hua University, Hsinchu, Taiwan, January 1997
- One-hour departmental applied mathematics seminar, Math. Dept., Texas A&M Univ., February 1997
- Invited one-hour departmental seminar, Math. Dept., Univ. of Nevada-Las Vegas, Las Vegas, NV, March 1997
- Twenty-minute talk, Texas PDE Conference, Math. Dept., Univ. of North Texas, Denton, TX, March 1997
- Thirty minute talk, Minisymposium in Appl. Math., Univ. of Wisconsin Mathematics Ph.D. Program Centennial, Madison, WI, May 1997
- Thirty minute invited talk Invited Session on the Modelling and Control of Shell Equations, Int. Federation of Aut. Control, Detroit, MI, July 1997
- Thirty minute invited talk, Invited Session on Control of Nonlinear Distributed Systems, Int. Federation of Aut. Control, Detroit, MI, July 1997

- One hour invited talk, CIMAT Int. Conf. on Dynamics and Control of PDEs, Guanajuato, Mexico, December 1997 (G. Chen, Co-Organizer)
- Invited one hour colloquium, Department of Mathematics, Dalhousie University, Halifax, Nova Scotia, Canada, August 1997
- One-hour departmental applied mathematics seminar, Math. Dept., Texas A&M Univ., September 1997
- Four-hour short course entitled “Chaotic Vibrations of the One-Dimensional Wave Equation” at CIMAT, Guanajuato, Mexico, in December 1997
- Twenty-five minute talk at the Texas PDE Conference, Texas A&M University, College Station, TX, April 1998.
- A seven hour short course entitled “Chaotic Vibration of the Wave Equation” at Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM), Mexico City, Mexico, May 1998.
- Two talks at the departmental applied mathematics seminar, Math. Dept., Texas A&M Univ., September and October 1998.
- Invited one-hour departmental colloquium, Math. Dept., UNLV, Las Vegas, NV, October 1998.
- A six-hour lecture series entitled “Chaotic Vibration of the Wave Equation” at the National Center for Theoretical Science, National Tsing Hua University, Hsinchu, Taiwan, August 1998.
- A three-hour lecture series entitled “Visualization of Solutions of Semilinear Elliptic PDEs” at the National Center for Theoretical Science, National Tsing Hua University, Hsinchu, Taiwan, August 1998.
- Thirty minute talk, “Chaotic Vibration of the Wave Equation by Nonlinear Boundary Control” in the Special Session on Control Systems Governed by PDEs, American Mathematical Society Western Section Meeting, April 1999, Las Vegas, Nevada.
- Thirty minute invited talk, “Boundary Element Numerical Method for Semilinear Elliptic Boundary Value Problems”, American Society of Mechanical Engineers 1999 Annual Meeting, Virginia Tech, Blacksburg, Virginia, June 1999.
- Thirty minute invited talk, “Chaotic Vibration of the One-Dimensional Wave Equation”, American Society of Mechanical Engineers 1999 Annual Meeting, Virginia Tech, Blacksburg, Virginia, June 1999.
- Thirty minute invited talk, “Grover’s Algorithm for Multiobject Search in Quantum Computation”, in ONR-TAMU Workshop on Quantum Optics, Jackson Hole, Wyoming, July 1999.

- Two one-hour talks in the departmental applied mathematics seminar, Math. Dept., Texas A&M University, Feb. and April, 1999.
- Invited one-hour departmental colloquium, Department of Mathematics, Oakland University, Rochester, Michigan, April 1999.
- Invited one-hour departmental colloquium, Department of Mathematics, The Technical University of Denmark, Lyngby, Denmark, August 1999.
- Invited one-hour departmental colloquium, Department of Mathematics, University of Texas-San Antonio, September 1999.
- One-hour technical presentation to Prof. M.O. Scully's Quantum Optics Group in the Dept. of Physics, Texas A&M University, October 1999.
- Twenty minute invited talk, "The Universality of the Quantum Fourier Transform in Forming the Basis of Quantum Computing Algorithms", The 30th Winter Colloquium of the Physics of Quantum Electronics, Snowbird, Utah, January 2000.
- Twenty minute talk, "Continuous-Time Quantum Multi-Object Search Algorithm", Texas PDE Conference, UT-Austin, April 2000.
- One hour special invited presentation, "Chaotic Vibration of the One-Dimensional Wave Equation by Nonlinear Feedback Boundary Control", The 3rd World Congress on Automation and Robotic Intelligence, Hefei, China, July 2000.
- Five minute technical briefing, "Multi-Object Quantum Search Algorithms with the Availability of Partial Information", DARPA Workshop on Quantum Information Science and Technology, Greenfeld, Maryland, October 2000.
- Twenty minute invited talk, "Chaotic Vibration of the One-Dimensional Wave Equation by Nonlinear Feedback Boundary Control", The 39th IEEE Control and Decision Conference, Sydney, Australia, December 2000.
- Twenty minute (walk-in) talk, "Multiplicity of Solutions of Nonlinear Elliptic Equations from Domain Geometries", The 39th IEEE Control and Decision Conference, Sydney, Australia, December 2000.
- Four one-hour talks in the departmental applied mathematics seminar, Math. Dept., Texas A&M University, January, September and October, 2000.
- One-hour invited talk at the Special PDE Seminar, School of Mathematics, University of Minnesota, Minneapolis, May 2000.
- A two-hour colloquium at the Department of Mathematics, Ningxia University, Yinchuan, Ningxia Province, China, June 2000.
- A four-hour invited lecture series at the Department of Mathematics, Wuhan University, Wuhan, China, June 2000.

- One-hour invited seminar at the Institute of Systems Science, Academia Sinica, Beijing, China, July 2000.
- Two 75-minute guest lectures at the Physics Dept. graduate course “Quantum Computing”, (taught by Prof. David Church) October 2000.
- One-hour talk in the Quantum Computing Seminar, Department of Computer Science, Texas A&M University, March 2001.
- One-hour invited colloquium at the Department of Mathematics, UNLV, Las Vegas, Nevada, April 2001.
- One-hour invited seminar at the National Center for Theoretical Science, Hsinchu, Taiwan, July 2001.
- Poster presentation (no talk), at the DARPA QuIST (Quantum Information Science and Technology) Kickoff Meeting, November 2001.
- One-hour talk as a guest lecturer in the Physics/C.S. Dept. graduate course “Quantum Computing” (taught by Prof. David Church), November 2001.
- Two one-hour invited technical seminars at the Centre for Chaos Control and Synchronization, The City University of Hong Kong, December 2001.
- Two-hour popular science talk (“Introduction to Chaos”) to the Gifted and Talented High School Students Program, sponsored by the Education Department of the City Government of Taipei and the Ninety-Nine Education Foundation, Taipei, Taiwan, December 2001.
- One-hour invited seminar at the Department of River and Harbor Engineering, National Taiwan Oceanography University, Keelung, Taiwan, December 2001.
- Twenty minute invited talk, “An Exponentially Fast Quantum Search Algorithm”, The 31st Winter Colloquium of the Physics of Quantum Electronics, Snowbird, Utah, January 2001.
- Twenty minute talk, “Multi-object Quantum Search with the Availability of Partial Information”, The 31st Winter Colloquium of the Physics of Quantum Electronics, Snowbird, Utah, January 2001.
- Twenty minute talk, “Computation and Visualization of the Lane-Emden Type Semilinear Elliptic Equations in 3D”, Texas PDE Conference, UH-Downtown, March 2001.
- Thirty minute invited talk in the Special Sessions for Nonlinear PDEs, “Numerical Solutions of Semilinear Elliptic Boundary Value Problems”, in the American Mathematical Society Western Section Meeting, Las Vegas, April 2001.
- Thirty minute invited talk, “On the Optimality of the Grover Quantum Search Algorithm”, in the Minisymposium on Quantum Computing, Hilton Hotel, College Station, Texas, (sponsored by the Computer Science Dept., TAMU), May 2001.

- Thirty minute invited talk in the Minisymposium on Control and Shape Optimization, “Visualization of Multiple Solutions of Semilinear Elliptic Equations”, SIAM Control Theory Conference, San Diego, July 2001.
- Thirty minute invited talk in the Minisymposium on Nonlinear Analysis, “Unbounded Growth of Total Variations of Snapshots due to Chaotic Vibration of the Wave Equation”, SIAM Control Theory Conference, San Diego, July 2001.
- Forty-five minute invited talk “Recent Progress in Quantum Computing and Quantum Search Algorithms”, in the Second International Congress of Chinese Mathematicians, Taipei, Taiwan, December 2001.
- Twenty minute contributed talk “Unbounded Growth of Total Variations due to Chaotic Vibration of the Wave Equation”, in the Second International Congress of Chinese Mathematicians, Taipei, Taiwan, December 2001.
- Thirty minute invited talk in Special Sessions on the theory and Applications of Partial Differential Equations, “Visualization of Multiplicity of Solutions of Semilinear Elliptic PDEs”, American Mathematical Society Annual Meeting, San Diego, January 2002.
- One-hour invited technical seminar (on quantum computing), U.S. Navy Space Surveillance and Warfare Center (SPAWAR), San Diego, January 2002.
- One-hour invited colloquium, “Introduction to Quantum Computation”, Department of Mathematics, Southern Illinois University, Carbondale, IL, January 2002.
- Two one-hour talks in the Quantum Computing Seminar, Department of Computer Science, TAMU, Spring Semester, 2002.
- Three one-hour talks in the Quantum Computing Seminar, Department of Computer Science, TAMU, Fall Semester, 2002.
- One-hour invited talk, “Chaos and Growth of Total Variations”, Mathematics Research Center (CIMAT), Guanajuato, Mexico, May 2002.
- One-hour invited talk, “Introduction to Quantum Computation”, Mathematics Research Center (CIMAT), Guanajuato, Mexico, May 2002.
- Poster presentation (no talk), at the DARPA QuIST (Quantum Information Science and Technology) Annual Technical Briefing, Boston, MA, September 2002.
- Twenty-five minute invited talk “Mathematical Models of Quantum Computing Devices”, in the conference “New Trends in Nonlinear Dynamics and Control and Their Applications” sponsored by NSF/AFOSR, Naval Postgraduate School, Monterey, CA, October 2002.
- One hour invited major talk “Mathematical Models on Contemporary Elementary Quantum Computing Devices”, in the conference “Quantum Control, Mathematical and Numerical Challenges”, CRM (Centre de Recherches Mathématiques), Université de Montréal, October 5-10, 2002, Montréal, Canada.

- Forty-five minute invited talk “Boundary Element Method for Semilinear Elliptic Boundary Value Problems”, Oberwolfach Mathematics Conference on Boundary Element Methods, Oberwolfach, Germany, December 2002.
- Twenty minute invited talk, “Quantum Circuit Design for Multi-object Search”, The 32nd Winter Colloquium of the Physics of Quantum Electronics, Snowbird, Utah, January 2003.
- Thirty minute invited talk, “Quantum Circuit Design for Multi-object Search”, The American Mathematical Society Annual Meeting, Baltimore, MD, January 2003.
- Invited one-hour colloquium in the Distinguished Lecture Series, “Introduction to Quantum Computing Devices”, Math. Dept., University of Wyoming, Laramie, Wyoming, Feb. 2003.
- Thirty minute talk, “Chaotic vibration of the wave equation with Duffing-like nonlinear boundary condition”, Texas Partial Differential Equation Conference, Math. Dept., University of North Texas, Denton, Texas, April 2003.
- Thirty minute invited talk, “Rapid fluctuations of iterative maps and chaotic vibrations of the wave equation”, in Dynamics and Control of Nonlinear Partial Differential Equations (an NSF-sponsored conference), Georgetown University, Washington, D.C., May 2003.
- Poster presentation (no talk), at the DARPA QuIST Semiannual Technical Briefing, Beverly Hills, California, June 2003.
- Thirty minute invited talk, “Visualization of eigenmodes of the H_2^+ molecular ion”, TAMU-ONR Conference on Quantum Electronics, Jackson Hole, Wyoming, July 2003.
- Two one-hour talks, “Analysis and Computation of the Homo- and Heteronucleus Molecular Ion, Part I and II”, Appl. Math. Seminar, Math. Dept., TAMU, Sept. 2003 and Nov. 2003.
- Two one-hour talks, “Introduction to NMR” and “Introduction to Quantum Dot Cellular Automata”, Quantum Computing Seminar, Comp. Sci. Dept., Sept. 2003 and Oct. 2003.
- Poster presentation (no talk), at the DARPA QuIST Semiannual Technical Briefing, Fort Lauderdale, Florida, Nov. 2003.
- Three one-hour talks in the Quantum Computing Seminar, Department of Computer Science, Texas A&M University, January, September and October, 2004.
- Two one-hour talks in the Applied Math. Seminar, Department of Mathematics, Texas A&M University, March and October, 2004.
- Poster presentation (no talk), “Mathematical Analysis of Spin-Based Quantum Dots Quantum Gates”, at the DARPA QuIST Semiannual Technical Briefing, Chicago, Illinois, May 2004.

- Invited one-hour technical seminar “Mathematical Analysis of Quantum Dots Computer Gates”, Jet Propulsion Laboratory, California Institute of Technology, July 2004.
- Invited one-hour seminar “Rapid Fluctuations of Chaotic Maps in \mathbb{R}^N ”, National Center of Theoretical Sciences, Tsing Hua University, Hsinchu, Taiwan, July 2004.
- Three one-hour talks in the Quantum Computing Seminar, Department of Computer Science, Texas A&M University, January, September and October, 2004.
- Two one-hour talks in the Applied Math. Seminar, Department of Mathematics, Texas A&M University, March and October, 2004.
- Twenty minute talk, “Asymptotic properties of two-center wavefunctions of the Schrödinger equation”, in Texas PDE Conference, Math. Dept., Texas A&M University, College Station, TX, April 2004.
- Poster presentation (no talk), “Mathematical Analysis of Spin-Based Quantum Dots Quantum Gates”, at the DARPA QuIST Semiannual Technical Briefing, Chicago, Illinois, May 2004.
- Invited one-hour technical seminar “Mathematical Analysis of Quantum Dots Computer Gates”, Jet Propulsion Laboratory, California Institute of Technology, July 2004.
- Invited one-hour seminar “Rapid Fluctuations of Chaotic Maps in \mathbb{R}^N ”, National Center of Theoretical Sciences, Tsing Hua University, Hsinchu, Taiwan, July 2004.
- Thirty minute invited talk, “Rapid fluctuations of chaotic maps in \mathbb{R}^N ”, in Neuberger Fest, a conference in honor of John W. Neuberger’s 70th Birthday, Math., Dept., University of North Texas, Denton, Texas, October 2004.
- Thirty minute invited talk, “Modeling, analysis and computation of simple molecules”, IFIP (International Federation of Information Processing) Annual Meeting, University of Houston, November 2004.
- Twenty minute invited talk, “Generalized two-centered orbitals in the modeling of diatomic molecules and relevant asymptotics”, in the 35th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 2005.
- Poster presentation, “Mathematical analysis of the Bohr atom model”, Joint Princeton, TAMU and Japan Society for the Promotion of Science Conference on Physics and Material Science, Princeton University, Princeton, N.J., February 2005.
- One hour invited talk, “Mathematical analysis of the Fourier spectrum of chaotic time series”, 2005 International Conference on Chaos and Dynamical Complexity, National Center for Theoretical Science, Tsing Hua University, Hsinchu, Taiwan, Rep. of China, May 2005.
- Thirty minute invited talk, “Quantum devices and quantum control”, 22nd IFIP (Int. Federation on Information Processing) TC7 Conference on System Modeling and Optimization, Turin, Italy, July 2005.

- Invited 1-hour colloquium “A dimension-scaling method for atoms and diatomic molecules”, Dept. of Environmental Science, University of Milan-Bicocca, August 2005.
- Invited 1-hour seminar “Introduction to quantum control and the dimensional scaling method for atoms and molecules”, in the Institute of Mathematics, Academia Sinica, Nankang, Taipei, Taiwan, Rep. of China, July 2005.
- Thirty minute invited talk, “Mathematical analysis of the Fourier spectrum of chaotic time series with applications to PDEs”, Conference on Differential and Difference Equations, Florida Institute of Technology, Melbourne, Florida, August 2005.
- One hour invited talk, “Dimensional scaling method for simple atoms and molecules”, in ”High-Dimensional PDEs in Science and Engineering”, Centre de Recherche Mathématiques, Université de Montréal, Montréal, Quebec, Canada, August 2005.
- Thirty minute invited talk, “Dimensional scaling method for the helium atom”, in Quantum Optics Summer Workshop, Casper College, Casper, Wyoming, August 2005.
- Twenty minute invited talk, “Dimensional scaling method for the excited states of helium atom”, in the 36th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 2006.
- Thirty minute invited talk, “Mathematical analysis of the Fourier spectrum of the chaotic vibration of the wave equation with a nonlinear boundary condition”, in the Joint AMS-SIAM-MAA Annual Meeting, San Antonio, TX, January 2006.
- Twenty minute talk, “Computation and dimensional scaling for some three body problems in atomic and molecular quantum mechanics”, Texas PDE Conference, Math. Dept., UT-Arlington, Arlington, TX, March 2006.
- One hour invited talk, “Wavelet analysis of the spectrum of chaotic time series”, Annual Meeting of the Taiwan Mathematical Society, National Normal University, Taipei, Taiwan, December 2006.
- One-hour seminar, “Superconducting quantum computing devices (I)”, in Quantum Computing Seminar, Dept. of Computer Science, Texas A&M Univ., College Station, TX, 3/29/2006.
- One-hour seminar, “Superconducting quantum computing devices (II)”, in Quantum Computing Seminar, Dept. of Computer Science, Texas A&M Univ., College Station, TX, 4/4/2006.
- Invited one-hour seminar, “Introduction to Quantum Computing Devices”, Institute of Applied Mechanics, National Taiwan University, Taipei, Taiwan, September 2007.
- Invited one-hour seminar, “Mathematical Analysis of the Bohr Atom Model”, Math. Dept., National Changhua University of Education, Changhua, Taiwan, November 2006.

- Invited one-hour seminar, “Introduction of Three Fundamental Principles of Quantum Computing”, Math. Dept., National Tsing Hua University, Hsinchu, Taiwan, November 2006.
- Invited one-hour seminar, “Visualization and Dimensional Scaling for the Schrödinger-Born-Oppenheimer Model of Helium”, Math. Dept., National Chao-Tung University, Hsinchu, Taiwan, November 2006.
- Invited two-hour colloquium, “A Chitchat on English Technical Writing”, Dept. of Agricultural Economics, National Taiwan University, Taipei, Taiwan, November 2006.
- Invited one-hour seminar, “Demonstration of Manuscript Submission and Editorial Review Criteria and Processes for Scientific Journals”, Dept. of Agricultural Economics, National Taiwan University, Taipei, Taiwan, December 2006.
- Invited one-hour seminar, “Visualization and Dimensional Scaling for the Schrödinger-Born-Oppenheimer Model of Helium”, Institute of Mathematics, National Taiwan University, Taipei, Taiwan, December 2006.
- Invited three-hour seminar, “Introduction of Three Fundamental Principles of Quantum Computing”, Institute of Mathematics, Academia Sinica, Nankang, Taipei, Taiwan, December 2006.
- Twenty minute invited talk, “Quantum-number D-scaling and mathematical issues in the associated max-min problem”, TAMU Molecular Physics and Quantum Optics Symposium, TAMU, College Station, TX, January 2007.

PARTICIPATION IN CONFERENCE (NO TALKS GIVEN)

- ARO Workshop on Quantum Information Technology and Computing, Baltimore, Maryland, August 2000.
- Symposium on Quantum Computation, MSRI, University of California, Berkeley, California, February 2000 (with travel support from the conference).

COMMITTEE WORK AND SERVICE

- Served on various departmental promotion and tenure committees, textbook selection and curriculum committees
- Reviewed proposals for funding agencies and reviewed papers for journals
- Organized conferences, minisymposia and special sessions and served as session chair
- External Reviewer for Dept. of Math., Southern Illinois University at Carbondale, IL, October 2002.