DAVID YANG GAO

Alexander M. Rubinov Professor
Graduate School of Information Technology and Mathematical Sciences,
University of Ballarat, P.O. Box 663, Ballarat, 3353,
Victoria, Australia
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Research Interests

1. **Applied Math and Computational Science**: Multi-scale modeling, analysis, and simulation of complex systems, nonconvex/nonsmooth analysis, nonlinear PDEs, bifurcation theory, nonlinear finite element methods, large-scale and multi-scale computations, primal-dual algorithms, computational complexity.
2. **Operations Research and Systems Engineering**: Global optimization, nonlinear and nonsmooth programming, integer programming, network optimization, information theory, decision science, distributed parameter control, energy systems optimization and control, duality in social network systems.
3. **Engineering Science and Mechanics**: Nonconvex/nonsmooth mechanics, large deformation elasto-plasticity, fluid dynamics, chaotic and dissipative dynamics, bio-mechanics, multi-scale modeling and simulation of phase transitions in material science, multi-functional structural mechanics, structural optimization and design.

Postdoctoral Experiences

1. Postdoctoral Fellow, Harvard University, 1989-1991, Advisor: Shing-Tung Yau.
2. Postdoctor & Lecturer, Yale University, 1988-89, Advisor: E.-T. Onate.
3. Postdoctoral Associate, M.I.T., 1986-88, Advisor: Gilbert Strang.

Educational History

1. Ph.D. in Mechanics and Applied Math, Tsinghua Univ., Beijing, 1986
2. M.S. in Space Engineering, Beijing Univ. of Aeronautics and Astronautics, 1982
3. B.S. in Manufacturing, Hefei University of Technology, 1978

Professional Appointments

1. Alex Rubinov Chair Professor of Mathematics, University of Ballarat, 2009-
2. S.C. Fang Chair Professor, Tsinghua University, Beijing, 2006-
3. Professor of Mathematics and Engineering Science (with Tenure), Director of Center for Numerical Simulation and Modeling, Louisiana Tech, 2002-2003.
4. Assistant and Associate Professor, Virginia Tech. 1992-2009.
5. Assistant Professor, University of Michigan, Ann Arbor, 1991-1992.
6. Associate Professor, Hefei University of Technology, 1986-1992.

Honorary and Adjunct Positions

1. Honorary Professor, Anhui Univ. of Science and Technology, 2000-
2. Adjunct Professor, Hunan University, 2009-
3. Honorary Professor, China Jilian University, Hangzhou, 2009-

Editorships

1. Editor-in-Chief: Encyclopedia of Duality in Engineering Science, Springer, 2006-
2. Co-Editor-in-Chief of Book Series:

(1) *Advances in Mechanics and Mathematics (AMMA)* (with Ray W. Ogden), Springer, 2002-present
(2) *Modern Mechanics and Mathematic (MMM)* (with Martin Ostoja-Starzewski) Taylor & Francis, 2002-present
(3) *Optimization and Control of Complex Systems* (with H.D. Sherali), Taylor & Francis, 2008-present

3. Member of Editorial Board:
   (1) *Advances in Material and Mechanics,* Springer/High Education Publisher, 2010-
   (2) *Discrete and Continuous Dynamical Systems*-B. AIMS Press, 2001-present;
   (3) *Journal of Global Optimization*, Springer, 1999-present;
   (4) *Journal of Industrial and Management Optimization*. AIMS Press, 2004-present
   (5) *Optimization Letters.* Springer, 2005-present.
   (6) *Electronic Journal of Technology in Mathematics,* 2006-present.

Current Research Grant

AFOSR/NL: Division of Mathematics, *Canonical Duality Theory And Algorithms For Solving Some Challenging Problems In Global Optimization And Decision Sciences,* 2009-2014: $750,000 (sole PI)

Previous Research Grants

1. Division of Computer & Information Science & Engineering, NSF: *Primal-Dual Method and Algorithm for large Scale Computation with Applications in Engineering Mechanics*, CCF-0514768, 2005-2009 (sole PI).
2. Division of Operations Research & Production Systems, National Science Foundation, CMMI-0455807, 2005-2006 (Co-PI).
3. International Union of Theoretical and Applied Mechanics Symposium Grant 2001-2002 (PI).
4. National Science Foundation, Division of Civil and Structural Engineering, CMS-0123932, 2001-2003 (PI).
5. Virginia Tech Millennium Grant, 1999-2000 (PI);
6. National Science Foundation, Division of Applied Mathematics, DMS-9400565, June, 1994 - June 1997 (PI).
7. International Chinese Research Grant of Republic of China, Taiwan (1992 summer)
8. Interdisciplinary Research Grant, University of Michigan (1991-1992).
9. NSERC International Fellowship Grant (1990-1991)
10. Lee Hysan Foundation, Hong Kong (1998-99).
11. National Natural Science Foundation of China, Outstanding Young Investigator Grant, 1988-1990 (PI).

Professional Leaderships

1. Vice President and Secretary-in-General, *International Federation of Global Optimization*, 2009-
2. Co-Chair, *1st World Congress on Global Optimization,* June 1-5, 2009, Hunan, China.
3. Co-Chair, *2nd International Workshop on Duality and Advances in Optimization*, May 23-24, 2009, Tsinghua University, Beijing, China.

4. Co-Chair, *International Workshop on Duality and Advances in Optimization,* Tsinghua University, Beijing, December 14-16, 2006.
5. General Co-Chairman, *First International Conference on Complementarity, Duality, and Global Optimization with Application in Engineering and Science*, August 15-17, 2005, Virginia Tech, Blacksburg, USA.
6. Co-Chairman, *International Symposium on Modern Mechanics and Mathematics*, University of Kleele, UK, August 26-29, 2003.
7. Co-Chair, *IUTAM Symposium on Duality, Complementarity and Symmetry in Nonlinear Mechanics,* August 13-16, 2002, Shanghai, China.
8. Vice-Chairman, *the 4th International Conference in Nonlinear Mechanics*, August 13-16, 2002, Shanghai, China.
9. Co-organizer, *International Conference on Optimization and Control with Applications*, August 17-20, 2002. The Yellow Mountains International Hotel, Anhui, China.
10. Co-organizer, *First Capitol City Symposium on Ultra-Thin Structures*, April 22-24, 2002. The George Washington University.
11. Co-Chairman, *International Symposium on Non-Smooth and Non-Convex Mechanics,* June 27-30, 1999 Virginia Tech. Blacksburg, VA, USA.
12. Co-Organizer, *International Symposium on Complementary-Dual Variational Principles and Numerical Methods*. July 14-19, 1997, Stanford University, USA.

Keynote, Plenary, and Invited Lectures at International Conferences.
1. Invited Lecture, [52th Workshop on Nonlinear Optimization, Variational Inequalities, and Equilibrium Problems, International School of Mathematics "G. Stampacchia"](), Erice, Italy, July 2-10, 2010.
2. Invited Lecture, International Conference on Optimization and Control (ICOCO-10), Gueiyang, China, July 18-23, 2010.
3. Plenary Speaker, [International Conference on Optimization, Simulation and Control, Ulaanbaatar, Mongolia](), July 25 - 28, 2010
4. Invited Speaker, Canonical Dual Solutions to General Sum of Quartic Polynomial Optimization Problems with Applications in Euclidean Distance Geometry [The 4th Australia-China Workshop on Optimization: Theory, Methods, and Applications.]() 9-11, December, 2009, University of Ballarat, Australia.
5. Plenary Lecture, Complete Solutions to a Class of Nonconvex Variational-Boundary Value Problems with Implications for Phase transitions and Computational Science, [The 3rd International Conference on Modeling of Complex Systems,]() CMCS'09, Doha, Qatar, May 5-7, 2009.
6. Plenary Lecture, Canonical Duality Theory: Unified Understanding of Global Optimization, [The First World Congress on Global Optimization with Applications,]() Hunan University, Changsha, China, June 1-5, 2009.
7. Invited Lecture, Unified solution to a class of nonconvex distributed parameter systems*, International [Conference on Mathematical Control Theory]() in honor of D.L. Russell for his 70th Birthday,* May 15-17, 2009, Beijing, China.
8. Invited Speaker, Dual feedback control in nonconvex systems, [The 4th International Conference on Optimization and Control with Applications (OCA2009)]() June 6-11, 2009, Harbin and Wudalianchi, China

9. Invited Lecture, Canonical duality theory – Unified understanding of global optimization. International Workshop on Global Optimization, Tsinghua, China, May 23-24, 2009.
10. Invited Lecture, Canonical duality theory for solving some challenging problems in machine learning and decision science, *AFOSR Workshop on Mathematical Foundation of Machine Learning,* January 26-27, 2009, Arlington, VA.
11. Invited Lecture, Advances of Canonical Duality Theory in Global Optimization and Applications. Foundations of Computer-Aided Process Operations (FOCAPO) 2008, June 29-July 2, 2008, Cambridge, MA
12. Invited lecture, Understand and Control Chaos: Canonical Duality Approach. 9th Conference on Dynamical Systems, Theory and Applications, Lodz, Poland, December 17-20, 2007.
13. Invited Lecture, Complete Solutions to a Class of Nonconvex Variational, Boundary Value Problems with Applications, *5th Internal Conf. on Nonlinear Analysis and Convex Analysis,* May 31-June 4, 2007, Hsinchu, Taiwan
14. Shu-Cherng Fang Distinguished Lecture, Introduction of Canonical Duality Theory. Tsinghua University, June 12, 2007.
15. Invited Lecture, *International Conference on Nonlinear Programming with Applications* (NPA2006)**,** *May 29 - June 1, 2006, Fudan University, Shanghai, China*.
16. Keynote Lecture (three-hours), *International Workshop on Duality and Advances in Optimization,* Tsinghua University, Beijing, December 14-16, 2006.
17. Plenary Lecture, *11th Asian Technology Conference in Mathematics* (ATCM 2006), 12 - 16 December, 2006.
18. Plenary Lecture. *The 2nd International Conference on Complementarity, Duality,and Global Optimization in Science and Engineering,* February 28 - March 2, 2007, J. Wayne Reitz Union, University of Florida, Gainesville, FL.
19. Invited Lecture (Optimization), *First AMS Joint International Mathematical Meeting with Taiwanese Mathematical Society and 2005 TWM Annual Meeting*, December 14-18, 2005 Taiwan.
20. Invited speaker, International Workshop on Optimization, May 28-30, 2005, Tongji, University, Shanghai.
21. Plenary speaker and scientific committee member, *the 3rd International Conference on Optimization and Control with Applications*, July 25-31, 2004, Chongqing, China.
22. Invited Lecture, the *3rd International Conference on Computational Modelling and Simulation of Materials,* May 29-June 4, 2004, Acireale, Sicily, Italy.
23. Penal speaker, *International Conference of Heterogeneous Materials Mechanics* (ICHMM-2004), June 21-26, 2004, Chong Qing, China.
24. Invited Lecture, *International Colloquium on Theoretical and Numerical Convex Analysis and Nonsmooth Mechanics* in Honor of the 80th Birthday of J.J. Moreau. November 17-19, 2003. Montpellier, France.
25. Keynote Lecture, the *International Conference on Non-smooth and Non-convex Mechanics*, Aristotle University of Thessaloniki, July 5-6, 2002, Greece.
26. Plenary Lecture, *The 7th Asian Technology Conference in Mathematics*, (ATCM2002), 17th-21st, December, 2002, Multimedia University, Malaysia

27. Plenary Lecture, *International Conference on Optimization and Control with Applications,* August 18-22, 2002. The Yellow Mountains, Anhui, China.

Current Post-Doctoral Associates:
>   Dr. Changzhi Wu, Dr. Jiapu Zhang, Dr. Daniel Silva

Post-doctors Advised within five years:
1. Dr. Ning Ruan, 2007-2009
2. Dr. Yubo Yuan, 2006-2007
3. Dr. Jinsoo Hwang, 2005-2006

Thesis Committees Served for Graduate Students at Virginia Tech,
>   F. Botelho (PhD), 2006- Dept of Math,   Chair
>   H. Yu (PhD), 2004-2008, Dept of Math,   Chair
>   R. Sopakayang (PhD), 2007- Dept. of Engineering Science and Mechanics
>   Weifong Rao (PhD), 2005-2009, Dept of Material Science, co-Chair
>   Bin Li (PhD), 2005-2009, Dept of Electrical and Computer Engineering
>   Nannan He (PhD), 2006-2009, Dept of Electrical and Computer Engineering
>   Saurabh Bisht (PhD), 2005-2009, Dept of Engineering Science and Mechanics
>   A. Ionita (PhD), 1998-2002, Dept of Engineering Science and Mechanics, Chair
>   D.X. Cai (MS), 1996-1999, Dept of Math, Chair
>   H. Liu (MS), 1997-1999, Dept of Math, Chair
>   B.Chen (PhD), 1996-1999, Dept of Engineering Science and Mechanics

Visiting Positions Held
1. Visiting Professor, Department of Structural Engineering, The National Technique University of Athens, Summer 2002.
2. Visiting Professor, Department of Mechanical Engineering, University of California, Berkeley, Summer 2001.
3. Visiting Assistant Professor, Department of Mechanical Engineering and Applied Mechanics, University of Michigan, 1991-1992.
4. Research Officer, Dept. Civil and Structural Engineering, University of Hong Kong, 1988.
5. Visiting Scholar, Dept. of Ocean Engineering, M.I.T., 1987-88.

Professional Organizations and Activities
1. American Academy of Mechanics
2. Mathematical Programming Society
3. INFORMS
4. Society for Industrial and Applied Mathematics (SIAM)
5. Pacific Optimization Research Activity Group (POP).

Social Activities and Leadership
1. President of Chinese Association of Scholars and Students (CASS) in Great Boston Area, 1987-1988.
2. Vice President of CASS at MIT, 1987-1988.
3. President of Chinese Faculty Association at the Univ. of Michigan, 1991-1992.

Professional Services
1. Scientific Committees served for
    1) International Conference on Optimization, Simulation and Control , Ulaanbaatar, Mongolia, July 25 - 28, 2010

2) The 10th Conference on Dynamical Systems -- Theory and Applications (DSTA 2009), Łódź, Poland, 7-10 December 2009.
3) The Forth International Conference on Optimization and Control with Applications (OCA2009) June 6-11, 2009, Harbin and Wudalianchi, China
4) International Organizing Committee Chair, *The Fourth Sino-Japanese Optimization Meeting,* 8/27-30, 2008, Tainan, Taiwan.
5) The 7th International Conference on Optimization: Techniques and Applications (ICOTA7), Kobe, Japan, Dec. 12-15, 2007.
6) *The 2nd International Conference on Complementarity, Duality, and Global Optimization,* Gainesville, Florida, February 28 - March 2, 2007
7) *International Conference on Nonlinear Programming with Applications* (NPA2006), May 29 - June 1, 2006, Fudan University, Shanghai, China.
8) The *1st and 2nd International Conference on Non-smooth and Non-convex Mechanics,* Aristotle University of Thessaloniki (A.U.Th.), June, 2002 and 2006.
9) The *2nd and 3rd International Conference on Optimization and Control with Applications* (OCA2002 and OCA-2004), China.
10) The *7th International Conference on Optimization and Technology*, Ballarat, Australia, December, 2004.
11) The *12th International WOSC Congress and the 4th IIGSS Workshop*, March 24 - 26, 2002 Pittsburgh, Pennsylvania, USA Sheraton Station Square Hotel.
2 Grant proposals reviewed for the following funding agencies:
1) National Science Foundation, DMS, DCII, and CISE.
2) US Army Research Office.
3) Chile National Science Foundation.
4) South Africa National Research Foundation (NRF).
5) Australian Research Council
3 Book proposals reviewed for the following publishers:
1) American Society of Mechanical Engineering (ASME)
2) John Wiley & Sons
3) Kluwer Academic Publishers (more than 15 manuscripts)
4) Chapman & Hall/CRC (more than six manuscripts)
5) Springer (more than 15 manuscripts)
6) World Scientific Press.
4 Manuscripts reviewed for the following journals:
5 AIAA Journal
6 Applied Mathematics Letters
7 Applied Mechanics Review
8 Discrete and Continuous Dynamical Systems
9 IEEE Dynamics of Continuous and Discrete Impulsive Systems
10 International Journal of Computers and Mathematics Application
11 Int. J. of Solids and Structures
12 Int. J. Non-Linear Mechanics
13 Journal of Computer Methods in Applied Mechanics and Engineering.
14 Journal of Differential Geometry
15 J. of Elasticity
16 Journal of Global Optimization (more than 25 papers).

17 J. Math Anal. Appl.
18 J. Mathematical Physics
19 J. Nonlinear Dynamics
20 Journal of Systems Science and Complexity
21 Mathematical and Computer Modelling
22 Mathematics Review
23 Math. Mech. Solids
24 Meccanica
25 Optimization and Control, Application and Methods.
26 Optimization and Engineering
27 Optimization Letters
28 Phil.   Trans. of the Royal Society: Mathematical, Physical and Engineering Sciences
29 Philosophical Magazine
30 Physica Status Solidi
31 Proceedings A of the Royal Society
32 Quarterly Journal of Applied Math and Mechanics
33 Z. Angew Math Mech. (ZAMM)
34 Z. Angew Math Phys **(ZAMP)**

Consulting

Ford Motor Company (1991-92);
Starmart Offshore Oil Company (1996-2002);
Kluwer Academic Publishers (1998-2004);
Chapman & Hall/CRC Press (since 1999);
Springer Science and Business Media (since 2004).

Publications

I. Monographs, Encyclopedia, Handbooks, Edited Books and Special Issues

1. Gao, D.Y., *Duality Principles in Nonconvex Systems: Theory, Methods and Applications*. Kluwer Academic Publishers, Boston/Dordrecht/London, 2000, xviii+454pp.
2. Gao, D.Y., R.W. Ogden and G. Stavroulakis, *Nonsmooth and Nonconvex Mechanics: Modelling, Analysis and Numerical Methods.* Kluwer Academic Publishers, Boston/Dordrecht/London, 2001, xliv+471pp.
3. Gao, D.Y. and R.W. Ogden, *Advances in Mechanics and Mathematics, AMMA2002,* Kluwer Academic Publishers, Boston/Dordrecht/London. 2002, xvii+302 pp.
4. Gao, D.Y., *Proceedings of IUTAM Symposium on Duality, Complementarity and Symmetry in Nonlinear Mechanics,* Kluwer Academic Publishers, Boston/Dordrecht/London, 434pp.
5. Gao, D.Y. and R.W. Ogden*, Advances in Mechanics and Mathematics, AMMA 2003,* Kluwer Academic Publishers, Boston/Dordrecht/London, 324pp.
6. Gao, D.Y. and K.L. Teo, *Duality in Global Optimization and Control*. Special issue of *Journal of Global Optimization*. 2004.
7. Gao, D. Y. and Sherali H.D., Complementarity, Duality, and Global Optimization, Special Issue of *J. of Global Optimization*. Springer, 2008.
8. Gao, D.Y. and Sherali, H.D. *Advances in Applied Mathematics and Global Optimization,* Springer 2009, 520pp.
9. Gao, D.Y., *Encyclopedia of Duality in Engineering Science* (three volumes), in preparation to be published by Springer.
10. Gao, D.Y. and Batra, R., *Handbook of Computational Mechanics and Methods* (two volumes), to be published by Springer.
11. Gao, D.Y. and Motreanu, D., *Handbook of Nonconvex Analysis and Applications,* International Press (to appear in 2010).

II. Articles in Encyclopedia

1. Gao, D.Y., Duality-Mathematics, *Wiley Encyclopedia of Electrical and Electronics Engineering,* 6, 1999, 68-77.
2. Gao, D.Y., Mono-Duality in Convex Optimization, in *Encyclopedia of Optimization,* C. A. Floudas and P.M. Pardalos (eds). Kluwer Academic Publishers, 2001. Vol. 1, pp. 482-485.
3. Gao, D.Y., Bi-Duality in Nonconvex Optimization, in *Encyclopedia of Optimization,* C. A. Floudas and P.M. Pardalos (eds). Kluwer Academic Publishers, 2001. Vol. 1, pp. 477-482.
4. Gao, D.Y., Tri-duality in Global Optimization, *in Encyclopedia of Optimization,* C. A. Floudas and P.M. Pardalos (eds). Kluwer Academic Publishers, 2001. Vol. 1, pp. 485-491.

III Review Articles

5. Gao, D.Y. and Sherali, H.D. (2008). Canonical duality: Connection between nonconvex mechanics and global optimization, in *Advances in Appl. Mathematics and Global Optimization,* 249-316, Springer, 2009
6. Gao, D.Y. (2008). Advances in canonical duality theory with applications to global optimization, *Proceedings of the Fifth International Conference on*

Foundations of Computer-Aided Process Operations (FOCAPO 2008), M. Ierapetriou, M. Bassett and S. Pistikopoulos (eds.), Omni Press, pp.73-82.

7. Gao, D.Y. (2007) Understand and control chaos in dynamical systems: Canonical duality approach and triality theory, *Modeling, Simulation and Control of Nonlinear Engineering Dynamical Systems* J. Awrejcewicz (ed.) Springer.

8. Gao, D.Y. (2003). Nonconvex semi-linear problems and canonical duality solutions, Advances in Mechanics and Mathematics, II, Kluwer, 261-311.

IV Papers to appear

9. Gao, D.Y., N. Ruan, and Sherali, H. (2009). Solutions and optimality criteria for nonconvex constrained global optimization problems with connections between canonical and Lagrangian duality, *J. Global Optimization*

10. Gao, D.Y. (2009). Unified canonical dual solutions to a class of problems in global optimization, to appear in *Computers & Chemical Engineering*

11. Feng, Z.S., Zheng, Shenzhou, and Gao, D.Y. (2009). Traveling wave solutions to a reaction-diffusion equation, *ZAM*, published online: March 4, 2009, DOI: 10.1007/s00033-008-8092-0

12. Gao, D.Y., Ruan, N. and Pardalos, P.M. (2009), Canonical dual solutions to sum of fourth-order polynomials minimization problems with applications to sensor network localization, submitted to *Sensors: Theory, Algorithms, and Applications*, P.M. Pardalos, Y.Y. Yu, V. Boginski, and C. Commander (eds). Springer.

13. Fang, S.-C., Gao, D.Y., Shue, R.L., and Xin, W.X. (2009). Global optimization for a class of fractional programming problems, to appear in *Journal of Global Optimization*

14. Ruan, N., Gao, D.Y., Jiao, Y. (2009). Canonical dual least square method for solving general nonlinear systems of quadratic equations, *Comput Optim Appl*, DOI 10.1007/s10589-008-9222-5

15. Gao, D.Y. and Sherali, H.D. (2009). Preface to *Advances in Applied Mathematics and Global Optimization*, a special volume dedicated to Professor G. Strang for his 70th Birthday, Springer, 2009.

16. Gao, D.Y. and Ruan, N. (2009) Solutions to quadratic minimization problems with box and integer constraints, to appear in *J. Global Optimization*

17. Zhang, X, Zhu Jinhao, and Gao, D.Y. (2009). Solution to nonconvex quadratic programming with both inequality and box constraints, to appear in *Optimization and Engineering*.

18. Sun, K, Tu, Shikui, Gao DY, and Xu, Lei (2008) Canonical Dual Approach to Binary Factor Analysis, Proc. 8th International Conf on Independent Component Analysis and Signal Separation, ICA 2009, Paraty, Brazil, March 15-18, 2009.

19. Feng, Z.S., and Gao, D.Y., (2009). An asymptotic expression of the Schr¨odinger equation, Z. angew. Math. Phys. DOI 10.1007/s00033-007-7102-y

20. Liu, J., Gao, D.Y., and Gao, Y (2009). Canonical duality for solving nonconvex and nonsmooth optimization problem, to appear in *Optimization and Engineering*.

V. Papers in Refereed International Journals

21. Gao, D.Y. and Ogden, R.W. (2008) Closed-form solutions, extremality and nonsmoothness criteria in a large deformation elasticity problem, *ZAMP*, 59 (2008) 498–517

22. Gao, D.Y.and Ogden, R.W. (2008) Multiple solutions to non-convex variational problems with implications for phase transitions and numerical computation, *Quarterly J. Mech. Appl. Math. .* 61 (4), 497-522

23. Gao, D.Y. and Yu, H.F. (2008). Multi-scale modelling and canonical dual finite element method in phase transitions of solids, *Int. J. Solids Struct.* 45 (2008) 3660–3673

24. Feng, Z.S. and Gao, D.Y. (2008) A nonconvex dissipative system and its applications, *J.Global Optimization.* 40 (4), 637 – 651.

25. Gao, D.Y. and Ruan, N. (2008) Solutions and optimality criteria for nonconvex quadratic-exponential minimization problem, *Math. Meth. Operations Research*, **67** (3), 479-491.

26. Wang, Z.B., Fang, S.-C., Gao, D.Y., and Xin, W.X., Global extremal conditions for multi-integer quadratic programming, *J. Industrial and Management Optimization*. 4(2), 213-226

27. Gao, D.Y. and Wei-Chi Yang (2008), Complete Solutions to Minimal Distance Problem between Two Nonconvex Surfaces, *Optimization*. Vol. 57(5), 705-714. DOI: 10.1080/02331930802355309.

28. Fang, S.-C., Gao,D.Y., R.-L. Shue, and S.Y. Wu (2008) Canonical Dual Approach for Solving 0-1 Quadratic Programming Problems, *J. Industrial and Management Optimization*.4 (1), 125-142

29. Gao, D.Y., Solutions and optimality criteria to box constrained nonconvex minimization problems, *J. Industrial and Management Optimization*. 3(2):293-304, 2007.

30. Xuan, Zhaocheng Feng, Zhao-Sheng, and Gao, D.Y. (2007). FEM Approach for Complementary Bounds of Stress Intensity Factors in Bimaterials, *Int. J. Nonlinear-Mechanics*. **42** 336– 341

31. X. Wang, Z. Feng, L. Debnath and D.Y. Gao, Burgers-Korteweg-de Vries equation and it approximation, *International Journal of Computer Mathematics*, Vol. 85 (6), 853-863.

32. Gao, D.Y., Duality in distributed-parameter control of nonconvex and nonconservative dynamical systems with applications, *Nonlinear Dynamics and Systems Theory,* 6(3), 257-279, 2006.

33. Gao, D.Y., Complete solutions to a class of polynomial minimization problems, *J. Global Optimization, 35, 131-143, 2006.*

34. Gao, D.Y. Sufficient conditions and perfect duality in nonconvex minimization with inequality constraints, *J. Industrial and Management Science*, 1:59-69, 2005

35. Gao, D.Y. Complementary variational principle, algorithm, and complete solutions to phase transitions in solids governed by Landau-Ginzburg equation. *Mathematics and Mechanics of Solid*, 9:285-305, 2004.

36. Gao, D.Y., Canonical duality theory and solutions to constrained nonconvex quadratic programming, *Journal of Global Optimization*, 29:377-399, 2004.

37. Gao, D.Y., Perfect duality theory and complete set of solutions to a class of global optimization, *Optimization*, 52 (4-5), pp. 467-493, 2003.

38. Gao, David Y.**,** Complementarity, polarity and triality in nonsmooth, nonconvex and nonconservative Hamiltonian systems, *Philosophical Transactions of the Royal Society: Mathematical, Physical and Engineering Sciences.* Vol. 359, 2347-2367, Abstract.

39. Gao, David Y., Analytic solution and triality theory for nonconvex and nonsmooth variational problems with applications, in *Nonlinear Analysis,* 42, 7, 2000, 1161-1193. pdf file

40. Gao, David Y., Canonical dual transformation method and generalized traility theory in nonsmooth global optimization, *J. Global Optimization,* 17, 2000, 97-126.

41. Gao, David Y., Finite deformation beam models and triality theory in dynamical post-buckling analysis. *Int. J. Non-Linear Mechanics* 35, 2000, 103-131. pdf file

42. Gao, David Y., General Analytic Solutions and Complementary Variational Principles for Large Deformation Nonsmooth Mechanics in *Meccanica* **34**, 1999, 169-198. ps file

43. Gao, D.Y. Pure complementary energy principle and triality theory in finite elasticity. *Mech. Res. Comm.* 26 (1999), no. 1, 31-37.

44. Gao, D.Y. General Analytic Solution for Fully Nonlinear, Nonconvex Variational Problems. *Problems of Nonlinear Analysis in Engineering Systems. An International Journal of IFNA-ANS*, 1(9), 1999.

45. Gao, D.Y., Duality, triality and complementary extremum principles in nonconvex parametric variational problems with applications, *IMA J. Appl. Math.*, 61, 1998, 199-235.

46. Gao, D.Y., Bi-complementarity and duality: A framework in nonlinear equilibria with applications to the contact problems of elastoplastic beam theory, *J. Appl. Math. Anal.*, 221, 1998, 672-697.

47. Gao, D.Y. and Russell, D.L., An extended beam theory for smart materials applications: II Static formation problems. *Appl. Math. Optim.* 38, (1998), no. 1, 69-94.

48. Cai, D.X. and Gao, D.Y., Shear Control and Analytic Solutions for 2-D Dynamical Smart Beam Theory. *J. Intelligent Material Systems and Structures*, 9, 1998, 182-188

49. Gao, D.Y., Dual extremum principles in finite deformation theory with applications to post-buckling analysis of extended nonlinear beam theory, *Applied Mechanics Reviews,* Vol. 50, 11, November 1997, S64-S71.

50. Gao, D.Y., Complementary finite element method for finite deformation nonsmooth mechanics, *J. Eng. Math.,* 30, pp. 339-353, 1996.

51. Gao, D.Y. and Russell, D.L., An extended beam theory for smart materials applications, Part I. Extended beam theory, duality theory and finite element simulations, *Appl. Math. Optimization*, 34, 3, 1996, 279-298.

52. Gao, D. Y., Stability analysis and extremum principles for rigid-plastic plates with large deflections, *European J. Mech., A/Solids*, 15 No 4, 599-615, 1996.

53. Gao, D.Y., Contact problem of 2-D elastoplastic beam theory and dual variational inequality, *Appl. Math. Mech.*, 17, 3, 953-968, 1996.

54. Gao, D.Y., Nonlinear elastic beam theory with applications in contact problem and variational approaches, *Mech. Research Communication*, 23, 1, pp. 11-17, 1996.
55. Gao, D.Y., Duality theory in nonlinear buckling analysis for von Karman equations, *Studies in Appl. Math*, 94, 1995: 423-444. MIT
56. Gao, D.Y. and Yang, W.H., Multi-duality in minimal surface type problems, *Studies in Appl. Math.*, 95, 1995: 127-146. MIT.
57. Gao, D.Y., Limit analysis of plastic shells subjected to large deflections, *European J. Mech., A/Solids,* 14, no 3, 1995, 459-472.
58. Gao, D.Y., Stability and extremum principles for post yield finite plasticity, *Acta Mechanica Sinica,* 10 (4), pp. 311-325, 1994.
59. Gao, D.Y., Global extremum criteria for nonlinear elasticity, *J. Appl. Math. Physics, (ZAMP)* 43 (1992), pp. 924-937.
60. Yau, S.T. and Gao, D.Y., Obstacle problems for von Kármán equations, *Adv. Appl. Math.*, 13 (1992), pp. 123-141.
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72. Gao, D.Y. and Cheung, Y.K., On the extremum complementary energy principles for nonlinear elastic shells*, Int. J. Solids & Struct.*, 26 (1989), pp. 683-693.
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78. Gao, Y., Penalty-duality finite element method in the analysis for incompressible medium, *J. of Hefei University of Technology,* 1 (1985).
79. Gao, Y.,   On the generalized variational principles of limit analysis with arbitrary yield conditions, *J. of Hefei University of Technology*, 1 (1984), pp. 1-14.
80. Gao, Y., Extended bounding theorems of limit analysis, *Appl. Math. Mech.,* 4 (1983), pp. 571-584.
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82. Gao, Y., Variational principles of limit analysis in discontinuous plastic field, *J. of Hefei University of Technology*, 1 (1982), pp. 44-51.

V. Book Chapters and Papers in Refereed Proceedings
83. Gao, D.Y. (2008). Advances in canonical duality theory with applications to global optimization, *Proceedings of the Fifth International Conference on Foundations of Computer-Aided Process Operations (FOCAPO 2008)*, M. Ierapetriou, M. Bassett and S. Pistikopoulos (eds.), Omni Press, pp.73-82.
84. Gao, D.Y. (2007) Understand and control chaos in dynamical systems: Canonical duality approach and triality theory, *Proceedings of 9th Conf. on Dynamical Systems- Theory and Applications,*J. Awrejcewicz, P. Olejnik, J. Mrozowski (ed.) , Lodz, Poland, Dec. 17-20, Vol. 1, 41-64 (ISBN: 978-83-924382-9-8).
85. Gao, D.Y., Canonical duality in nonsmooth, concave minimization with inequality constraints, to appear in *Advances in Nonsmooth Mechanics*, a special volume in honor of Professor J.J. Moreau's 80th birthday, P. Alart and O. Maisonneuve (eds). Springer, 2005, pp305-314.
86. Gao, D.Y. Multi-scale modeling and duality algorithm in phase transitions of ferroelectric materials, *Proceedings of the 3rd International Conference on Computational Modelling and Simulation of Materials,* Pietro Vincenzini (eds), 2004.
87. Gao, D.Y. Nonconvex Semi-Linear Problems And Canonical Duality Solutions, *Advances in Mechanics and Mathematics,* Vol. II, 261-312. Springer.
88. Gao, D.Y., Duality, complementarity, and polarity in nonsmooth/nonconvex dynamics and global optimization. *Proceedings of IUTAM Symposium on Complementarity, Duality and Symmetry in Nonlinear Mechanics*, D.Y. Gao (eds). Kluwer Academic Publishers, 2003. pp. 21-65.
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91. David Y. Gao, Jie-Fang Li and D. Viehland, Triality theory to Landau-Ginzburg equation in imperfect ferroelectrics, *Proceedings of the 4th International Conference on Nonlinear Mechanics*, W.Z. Chien (ed), Shanghaui University Press, 2002.
92. Gao, D.Y., Duality and triality in non-smooth, nonconvex and nonconservative systems: A survey, new phenomena and new results, in *Nonsmooth/Nonconvex Mechanics with Applications in Engineering,* edited by C. Baniotopoulos. Thessaloniki, Greece. 2002, pp. 1-14.
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94. Gao, D.Y., Duality and triality: Unify Mathematical Physics and Global Optimization, Plenary lecture, *Proceedings of the 7th Asian Technology Conference in Mathematics,* ATCM, Inc., 2002.
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98. Gao, D.Y., Minimax and triality theory in nonsmooth variational problems, in *Reformulation: Nonsmooth. Piecewise Smooth, Semismooth and Smoothing Methods* M. Fukushima and L.Q. Qi eds., Kluwer Academic Publishers, 1998, pp. 161-179.
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101. Gao, D.Y., Complementarity and duality in natural sciences, *Philosophical Study in Modern Science and Technology,* Tsinghua University Press, 12-25, 1996.
102. Gao, D.Y. and Russell, D.L., Finite deformation extended beam theory and nonlinear buckling analysis, *Contemporary Research in the Mathematics and*

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106. Gao, D.Y., Upper bound theorems for plastic dynamics of large deformation, *Adv. in Applied Mathematics and Mechanics in China,* Vol. 3, pp. 171-178, Int. Acad. Publ., Beijing, 1991.

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108. Gao, D.Y., Convex analysis and mathematical theory of plasticity, *Modern Mathematics and Mechanics,* Z.H. Guo (ed.) Beijing University Press, 1988, pp. 165-187.

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111. Gao, D.Y., Variational principle with movable boundary for nonlinear elasticity, *Proc. 20th Midwestern Mechanics Conference,* Purdue University, 1987.

112. Gao, D.Y. and Hwang, K.C., Panpenalty finite element methods, *Computational Mechanics'86, Theory and Applications* Ed. by S. Atluri-Yagawa, Springer-Verlag, 1986, Vol. 1, pp. 191-196.

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VI. Book Review, Preface, and Recreation Articles

114. Gao, D.Y. and Sherali, H.D. (2008), Preface to Complementarity, Duality, and Global Optimization, *J. Global Optimization*.

115. Gao, D.Y. and Teo, K.L., Preface for special issue on Duality, *J. Global Optimization,* 29, 2004.

116. M. Kamat and David Y. Gao (1999): Book review for *Nonconvex Optimization in Mechanics: Algorithms, Heuristics and Engineering Applications by the F.E.M.* by E.S. Mistakidis, G.E. Stavroulakis. Kluwer Academic Publishers, Dordrecht, Boston, London. In: *Applied Mechanics Reviews*, Volume 52, Number 6, Review 6R2, page B58, American Society of Mechanical Engineers, June 1999.

117.   Gao, D.Y. (2002): Canonical Dual Transformation Method: A New Powerful Approach in Global Optimization and Nonconvex Variational Problems, *Optimization Research Bridge*, Issue 7, September 2002, http://www.ballarat.edu.au/itms/orb/index.html.
118.   Gao, D.Y. (2002): An Intelligent, Energetic and Popular Greek-American Scientist, an interview with Professor Panos Pardalos. *Optimization Research Bridge*, Issue 8, December, 2002, http://www.ballarat.edu.au/itms/orb/index.html

VII. Dissertations

1. *Complementary-Dual Principles in Nonsmooth Elasto-plastic Systems and Pan-penalty Finite Element Methods,* 236pp. Ph.D. Thesis. Tsinghua University, 1986.
2. *Plastic Buckling Analysis and Limit Analysis in Sheet Metal Forming Process*, 65pp. M.A. Thesis. Beijing University of Aeronautics and Astronautics, 1982.

Invited Lectures and Colloquium Talks at Institutions

1. General closed solutions to a class of nonlinear equations, Department of Mathematics, Harvard University, August 1, 2008.
2. Canonical duality theory and applications in global optimization, Dept of Industrial and Systems Engineering, University of Florida, April 22, 2008
3. Canonical duality theory for solving some challenging problems in mechanics and global optimization, Dept Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Jan. 29, 2008.
4. Canonical Duality Approaches for Solving a Class of NP-hard Problems in Global Optimization and Nonconvex Systems, Department of Electric Engineering and Computer Science, *MIT*, May 11, 2007
5. Duality and Triality: Unifying Mathematical Modeling, Methods, and Computational Science, Department of Computer Science and Engineering, *The Chinese Univ. of Hong Kong,* June 5, 2007.
6. Two lectures on Canonical Duality Theory with Applications in Nonconvex Analysis and Global Optimization, Department of math, *Tongji Univ.*, June 7-8, 2007
7. The Beauty of Duality Theory and Applications in Mathematical Science, *Institute of Operations Research, Tsinghua Univ.*, June 18, 2007.
8. Canonical Duality Theory and Feedback Control Against Chaos in Nonconvex Dynamics, Institute of Nonlinear Dynamical Systems, *Beijing University of Aeronautics and Astronautics*, June 19, 2007.
9. Canonical Duality Theory: A Potentially Powerful Methodology for Solving Challenging Problems in Global Optimization and Complex Systems, *Department of Industrial and System Engineering, North Carolina State Univ.* Oct. 2, 2007.
10. Beauty and Unity in Optimization and System Science: Canonical Duality Theory, *Department of Industrial and System Engineering, Virginia Tech*, Oct. 12, 2007.
11. Unified Canonical Duality Theory for Solving a Class of Nonconvex Problems with Applications in Integer Programming, Department of Mathematics, *Simon Fraser University,* Nov. 21, 2007.

12. Complete Solutions to a Class of Nonconvex Variational Problems with Implications for Numerical Computation and Global Optimization, *Pacific Institute for mathematical Science,* Nov. 23, 2007.
13. Canonical Duality Theory for Solving General Constrained Global Optimization Problems with Applications to Sensor Network Localization, *Institute of Intelligent Information and Communications Technology, Konan Univ.,* December 12, 2007.
14. Canonical duality theory for solving constrained global optimization and applications, *Department of Mathematics, Tonji University,* December 28, 2006.
15. Duality methodology in system theory and management science, *School of Management, University of Shanghai for Science and Technology*, December 29, 2006.
16. Dual variational principle and algorithm for solving nonlinear partial differential equations and nonconvex dynamical systems, *Institute of Ocean Engineering*, December 27, 2006.
17. Canonical duality and triality, a potentially powerful method for solving nonlinear variational/optimization problems, *Department of Mathematics, University of Oakland,* Nov. 9, 2006.
18. Polarity-rescaling method for solving large-scale nonsmooth optimization problems, Grado Department of Industrial and Systems Engineering Virginia Tech, October 11, 2006.
19. Canonical duality theory in global optimization and application, department of electrical engineering, *Princeton University*, August 4, 2006.
20. Complementary variational principles in large deformation theory with applications in structural limit analysis and chaotic dynamics, *Dept of Civil Engineering, University of Nottingham*, June 30, 2006.
21. Duality and triality: unifying mathematics, science, and human understanding, *S.-C. Fang Distinguished Lecture, Department of Mathematical Science, Tsinghua University,* June 1, 2006.
22. Unified complementary variational principle in nonconvex continuum mechanics, *Shanghai Institute for Applied Mathematics and Mechanics, Shanghai University,* May 31, 2006.
23. Canonical duality theory: unifying mathematical physics, optimization, and scientific computation, *Department of Mathematics, University of Texas, Pan-American*, April 24, 2006.
24. Canonical duality theory & complete solutions to certain global optimization problems, *Department of Industrial Engineering, Virginia Tech,* Feb. 8, 2006.
25. Canonical duality theory and method for solving nonconvex variational-optimization problems with applications, *[Institute for Scientific Computing and Applied Mathematics,](#) Indiana University,* Bloomington, IN. Sep. 21, 2005.
26. Primal-dual methods and algorithm in large-scale nonconvex optimization and application, *Department of Math, University of Wisconsin,* Milwaukee, September 5, 2005.
27. Duality, triality and unity in arts, science, and religion, *Institute of Information Science, Konan University,* Japan, June 8, 2005.

28. Yin-Yang duality theory and applications in Chinese Medicine, No. 2 Shanghai University of Medicine, June 2, 2005.
29. Unified framework in mathematical physics, *Department of Mathematics and Statistics, University of Otago,* New Zealand, August 3, 2004.
30. Duality and triality in arts and science, *Department of Applied Mathematics, Hong Kong Polytechnic University*, July 22, 2004
31. Complementary variational principles in finite elasticity, *Institute of Engineering Mechanics, Beijing Jiao Tung University,* June 15, 2004.
32. Duality and triality in natural philosophy, religion and science, June 10, Shanghai Jiao Tung University, 2004.
33. Promoting research in engineering, science and computing in a university environment, *Division of Engineering and Science, Curtin University,* Perth, Australia, Feb. 13, 2003.
34. Framework in Natural Science and Philosophy, *Department of Ocean Engineering, Shanghai Jiao-Tong University, Shanghai,* China, August 13, 2002.
35. Duality and Triality in Mathematics and Scientific Computations, Department of Mathematics, University of Auckland, New Zealand, January 22, 2002.
36. Large-Scale Computation and Simulation: A Duality Approach, College of Engineering and Science, Louisiana Tech University, December 14, 2001.
37. Duality and Triality: Unifying Mathematics and Natural Sciences, Colloquium talk at Department of Math., University of Glasgow, January 18, 2001
38. Closed solution for large deformation mechanics and applications, Two-hours lecture at the *Department of Engineering Mechanics and Technology, Tong-ji University*, January 11, 2000.
39. Canonical dual transformation method and applications in nonlinear boundary value problems and nonconvex Hamiltonian systems, Two-hours lecture at the *Department of Mathematics, University of Science and Technology of China,* January 9, 2000.
40. Complementary and dual variational methods in large deformation nonsmooth and nonconvex mechanics, Two-hours lecture at the D*epartment of Modern Mechanics, University of Science and Technology of China,* January 8, 2000.
41. Generalized complementarity methodology in science and technology, One-hour honoring lecture presented for the Mayer of Huainan, Presidents and department heads at *Huainan Institute of Technology*, January 5, 2000.
42. Philosophical Principles of Natural Systems, Two-hours Institute Address at *Huainan Institute of Technology,* January 4, 2000.
43. General Analytic Solutions and Duality Theory for Fully Nonlinear Variational/Boundary Value Problems Governed by Nonsmooth Constitutive Laws. *Department of Mathematics, George Mason University,* March 26, 1999.
44. Hellinger-Reissner's Open Problem and Analytic Solutions for Finite Deformation Theory, *Dept. of Engineering Science and Mechanics Virginia Tech.,* Nov., 1998.
45. Nonconvex variational problems and phase transitions, Invited Colloquium talk, Department of Mathematics, *The George Washington University,* April 25, 1997
46. A new phenomenon in eigenvalue problem on extremum surface, *Department of Mathematics, Univ. Michigan*, April, 1992.
47. Department of Mathematics, *Univ. California, Irvin,* Feb. 1992.

48. Institute of Applied Mathematics, *Indiana University,* Sep. 1991. Invited by Prof. R. Temam.
49. Department of Mathematics, *West Virginia University*, March, 1991.
50. Dept. of Mathematics, *West Chester University*, March, 1991.
51. Department of Mathematics, *Beijing University,* December, 1988.

Talks at International Conferences and Symposia (Invited by Organizers).
52. Complete Solutions to Multi-Scale Nonconvex Variational/Boundary value Problems with Implications for Phase Transitions and Computational Science, 5th World Congress on Nonlinear Analysis, July 2-9, 2008, Orlando, Florida
53. Multiple and Nonsmooth Solutions to a Class of Nonconvex Variational Boundary value Problems, 5th World Congress on Nonlinear Analysis, July 2-9, 2008, Orlando, Florida
54. Canonical Duality Approach for Solving Sensor Network Localization Problem, *Sensor 2008: Theory, Algorithms, and Application,* April 24-26, 2008, Research and Engineering Education Facility (REEF), University of Florida Shalimar, FL
55. Advances in Canonical Duality Theory, *INFORMS Optimization Society 2008 Conference on Theory, Computation, and Emerging Applications,* March 14 - March 16, 2008, Georgia Tech, Atlanta, GA.
56. Identifying extrema in a non-convex problem of nonlinear elasticity with non-smooth solutions, with Ray Ogden, *44th Annual Technical Meeting Society of Engineering Science,* October 21–24, 2007, TAMU, College Station, TX
57. Canonical Dual Finite Element Method for Solving Large Deformation Nonconvex Variational Problems with Applications in Landau-Ginzburg Theory in Phase Transitions, *44th Annual Technical Meeting Society of Engineering Science,* October 21–24, 2007, TAMU, College Station, TX
58. Nonconvex minimization problems with box or integer constraints are not NP-hard unless the canonical dual problems have no global maximizers. *Second International Conference on Continuous Optimization + Modeling and Optimization: Theory and Application,* McMaster Univ. Canada, August 13 - 16, 2007
59. Canonical Duality Theory for Solving Constrained Global Optimization Problems and Connections with Lagrangian Duality, with N. Ruan and H. Sherali, *7th International Conference on Optimization: Techniques and Applications (ICOTA-07),* Kobe, Japan, Dec. 12-15, 2007.
60. Advances in Canonical Duality Theory and Applications in Global Optimization and Nonconvex Systems, with S.C. Fang, *7th International Conference on Optimization: Techniques and Applications (ICOTA-07),* Kobe, Japan, Dec. 12-15, 2007.
61. Solutions to Nonconvex Quadratic Minimization with Box and Linear Inequality Constraints, with Zhang Xi, and Zhu Jing-Hao, *(ICOTA-07),* Kobe, Japan, Dec. 12-15, 2007.
62. Dual Feedback Control Against Chaos in Nonconvex Dynamics, *The 3rd Shanghai International Symposium on Nonlinear Sciences and Applications (Shanghai NSA'07)*, Fudan Univ. Shanghai, June 6-10, 2007.

63. Canonical Duality Theory in Global Optimization and Application, *International Workshop on Optimization and Engineering Applications*, November 11 - 16, 2006, Banff, Canada.
64. Optimality and controllability of complex systems with distributed parameters, *The 6th International Conference on Dynamical Systems and Differential Equations,* University of Poitiers, France, June 25 - 28, 2006.
65. Canonical duality theory and algorithm for solving nonconvex mechanics problems with applications in phase transitions and chaotic dynamics, *Second International Conference on Nonsmooth/Nonconvex Mechanics with Applications in Engineering (NNMAE2006)*, Aristotle University Of Thessaloniki, Greece, Member of Scientific Committee, 7 & 8 July, 2006.
66. Complete solutions to a class of nonconvex/nonsmooth variational problems, *The 6th AIMS Conference,* University of Poitiers, France, June 25 - 28, 2006.
67. New way to understand chaos: canonical duality approach, *The 6th AIMS Conference,* University of Poitiers, France, June 25 - 28, 2006.
68. Post-buckling life of nonlinear beam vibration: modeling, new phenomena, and stability criteria, *43rd Annual Technical Meeting Society of Engineering Science,* Penn State University, August 13–16th, 2006.
69. Complete solutions to a class of nonconvex finite deformation problems with applications, *43rd Annual Technical Meeting Society of Engineering Science,* Penn State University, August 13–16th, 2006.
70. Canonical Duality Theory and Method for Solving Non-convex and Non-conservative Hamilton Systems with Applications, The 112th Annual Meeting of AMS, San Antonio, Texas, January 12-15, 2006.
71. Canonical Duality Theory and Algorithm for Solving Semi-Linear Nonconvex Variational/PDE Systems with Applications, AMS Conference, *Nonlinear PDE Evolutionary Systems and their control,* October 15-16, 2005 East Tennessee State University of Johnson City, TN.
72. Stability criteria and dual feedback control against chaotic vibration of large deformed beam structure, *ASME International Mechanical Engineering Congress and Exposition*, Nov. 5-11, 2005, Orlando, Florida (session co-Chair).
73. Complete solutions to polynomial minimization problems with application, *INFORMS Annual Meeting*, San Francisco, November 13-16, 2005.
74. Triality theory and algorithm for solving nonconvex variational problems with applications to phase transitions and chaotic dynamics, 2005 Middle West Numerical Analysis Conference, University of Iowa, May 19-21, 2005.
75. Polarity principle and algorithm for electrodynamics. *Symposium on Developments in Continuum Electrodynamics at The 40th Annual Meeting of Society of Engineering Science.* Ann Arbor, MI, October 12-15, 2003.
76. Complementary principle and algorithm to phase transition in finite deformation solids, *G.A. Maugin Symposium*, Ann Arbor, MI, October 12-15, 2003.
77. Complete solutions and triality to Landau-Ginzburg equations in imperfect ferroelectrics, *The 4th International Conference on Nonlinear Mechanics*, August 13-16, 2002, Shanghai, China.
78. Triality and primal-dual algorithm for ginzburg-landau equation, Symposium on Ginzburg-Landau Equation in Superconductivity and Related Topics at the

Fourth International Conference on Dynamical Systems and Differential Equations, Wilmington, NC, USA, May 24-27, 2002

79. Generalized min-max theory and sequential canonical dual transformation method, *Symposium on Recent Trends in Nonlinear Analysis,* Wilmington, NC, USA, May 24-27,2002

80. Triality and new phenomena in non-smooth, non-convex and non-conservative Hamilton systems, Symposium on Hamilton Systems at the *Fourth International Conference on Dynamical Systems and Differential Equations*, Wilmington, NC, USA, May 24-27, 2002

81. Stability and controllability for non-convex distributed-parametrical systems: a duality approach and new phenomena. *Fifth SIAM Conference on Control and Its Applications,* July 11-14, 2001, Town & Country Hotel, San Diego, California, USA

82. Duality reformulation and extended min-max theory for nonsmooth global optimization with applications. *The 17th International Symposium on Mathematical Programming,* Atlanta, August 7-14, 2000.

83. Dual feedback control against chaotic vibrations*, Year 2000 International Conference on Dynamical Systems and Differential Equations*, Kennesaw State University, Atlanta, Georgia, USA, May 18 to 21, 2000

84. General analytic solutions and duality theory for nonconvex variational/boundary value problems with applications in dynamical post-bifurcation of nonlinear structures, *NSF-CBMS Regional Research Conference on Mathematical Control Theory of Coupled Systems of Partial Differential Equations.* Lincoln, Nebraska, August 5-9, 1999.

85. Von Karman's paradox and extended plate theory with applications in post-buckling analysis*, Symposium on Modern Trends in the Foundation of the Theory of Shells and Plates in honor of Professor D. Frederick*, Blacksburg, June 27-30, 1999

86. Post-buckling analysis of nonlinear dynamical thick beam model and dual variational principles, *The 7-th Int. Conf. on Nonlinear Vibrations and Control,* Virginia Tech, June, 1998.

87. *International Conference on Dynamics and Control of Partial Differential Equations,* CIMAT, Gunajuato, Mexico, November 29-30, 1997.

88. *The International ISAAC'97 Congress*, June 3-7, 1997, Delaware, USA.

89. On the triality theory in finite deformation elasticity, *SIAM 45th Anniversary meeting*, Stanford University, July 14-19, 1997

90. *The 16th International Symposium on Mathematical Programming*, Lausanne, Switzerland, August 24-29, 1997. 30 min. invited talk

91. *1996 AMS-IMS-SIAM Summer Research Conference on Optimization Methods in Partial Differential Equations*, June 16-20, 1996, Mount Holyoke, sponsored by AMS. 30 min. invited talk,

92. *U.S.-China Workshop on Mechanics and Manufacturing Science*, Beijing, August, 1996, sponsored by NSF and NNSF of China. 50 min invited talk,

93. *Int. Conf. Complementarity Problems,* Baltimore, MD, Nov. 1-4, 1995. 30 min. invited talk.

94. *The 15th International Symposium in Math. Programming*, Ann Arbor, MI, 1994, 30 min.invited talk and Chair for Variational Inequality and Complementarity Session.
95. *The 4th Int. Conf. of System Research, Informatics and Cybernetics*, Baden-Baden, W. Germany, Aug. 1988. 30 min. invited talk.
96. *The 2nd National Conf. on Engineering Computational Mechanics*, July, 1986, Shanghai, China.
97. *The 1st National Conference on Modern Mathematics and Mechanics,* Beijing University, Aug. 1986. 45 minute invited lecture.
98. *National Congress of Natural Philosophy,* July, 1986, Yellow Mountain, Anhui, 1 hour invited lecture, excellent paper award.

Contributed Talks at Professional Conferences

99. Analytic solution to 3-d finite deformation problems of elasticity, *ASME International Mechanical Engineering Congress and Exposition*, Nov. 5-11, 2005, Orlando, Florida.
100. Canonical dual transformation and algorithm for solving nonconvex variational problems with applications to phase transitions and chaotic dynamics, 2005 International Conference on Scientific Computation and Differential Equations, May 23-27, 2005. Nagoya, Japan.
101. Duality Theory and Analytic Solutions in Phase Transitions with Applications, *2001 Mechanics And Materials Conference*, June 27-29, 2001, Sheraton San Diego Hotel and Marina.
102. *SIAM Annual Meeting*, Westin Rio Mar Beach Resort and Country Club, Puerto Rico, July 10 -14, 2000. Three talks:
    a. Duality Method for Parametric Controlling of Chaotic Systems: An Potentially Powerful New Approach and Applications,
    b. Prima-Dual Method and Triality Theory for Nonsmooth Global Optimization and
    c. General Analytic Solutions and Duality Methods for Fully Nonlinear, Nonsmooth Variational/Boundary Value Problems.
103. Duality control in dynamical post-bifurcation of nonlinear smart beam, *The 8th Conference on Nonlinear Vibrations, Stability and Dynamics of Structures*, July 23-27, 2000. In Honor of Dean T. Mook and Friedrich Pfeiffer on the Occasion of their 65th Birthday Virginia Polytechnic Institute and State University Blacksburg, Virginia
104. Canonical dual transformation and generalized Caratheodory condition in global optimization, *International Conference On Advances In Convex Analysis And Global Optimization*, Honoring the memory of C. Caratheodory (1873-1950) June 5-9, 2000 - Pythagorion, Samos, Greece.
105. Triality theory and general solutions for nonconvex/nonsmooth variational problems with applications in nonconvex dynamics and differential geometry *Sixteenth Southeastern Analysis Meeting* March 17-18, 2000, Dept. of Math., University of Virginia.
106. Duality and Triality in Nonconvex-Nonsmooth Systems: A Powerful Approach for Nonlinear Phenomena with Applications *Perspectives in Applied*

Mathematics: A Scientific Conference in Honor of Gil Strang on the Occasion of his 65th Birthday. Cambridge, MA, USA December 3-4, 1999.

107.   Analytic solutions for 3-D nonconvex-nonsmooth finite deformation elastoplasticity with applications in Nonsmooth-Nonconvex Mechanics, International Symposium in Honor of P.D. Panagiotopoulos. Virginia Tech, June 27-29, 1999 (Symposium organizer).

108.   Minimax and triality theory in nonconvex, nonsmooth optimization with applications *Sixth SIAM Conference on Optimization,* Sheraton Atlanta Hotel, Atlanta, Georgia, May 10-12, 1999

109.   Analytic solutions and duality theory in fully nonlinear partial differential systems with applications, *1999 SIAM Annual Meeting* (PDE session Chair) Sheraton Atlanta Hotel, Atlanta, Georgia, May 12-15, 1999

110.   Post-buckling analysis of nonlinear dynamical thick beam model and dual variational principles, *The 7-th Int. Conf. on Nonlinear Vibrations and Control,* Virginia Tech, June, 1998.

111.   On the Hellinger-Reissner's Open Problem and the General Analytic Solution in Finite Deformation Theory. *Thirteenth US Congress of Appl. Mechanics,* Gainesville, Florida, June 21-26, 1988.

112.   *Fifth Pan American Congress on Applied Mechanics*, January, 2-4, 1997, San Juan, Puerto Rico.

113.   *14th U.S. Army Symposium on Solid Mechanics*, 16-18 October, 1996, Myrtle Beach, South Carolina.

114.   *Symposium on Nonlinear Elasticity in Honor of J.L. Eriksen, ASME Mechanics and Materials Conference,* The Johns Hopkins University, Baltimore, MD, June 12-14, 1996. 25 min. invited talk.

115.   *The 18th Southeastern Conference on Theoretical and Applied Mechanics*, April 14-16, 1996, Tuscaloosa, AL.

116.   *SIAM Annual Meeting*, Three contributed talks, Charlotte, NC, Oct. 23-26, 1995

117.   *SIAM Annual Meeting*, San Diago, CA, July 25-29, 1994.

118.   *The 17th Southeastern Conference on Theoretical and Applied Mechanics*, Hot Springs National Park, Arkansas, April 10-12, 1994.

119.   *Int. Conf. Computational Methods in Structural and Geotechnical Engineering*, Hong Kong, Dec. 12-14, 1994. Invited by the Conference Chairman.

120.   *Int. Sym. Methods and Appl. of Analysis*, Hong Kong, Dec. 16-19, 1994

121.   *The 3rd SIAM Conference on Geometric Design,* Nov. 1993, Tempe, Arizona. Chair for Surface Modeling session.

122.   *The 2nd Int. Conf. Indust. Appl. Math.*, Washington, D.C. USA, July, 1991.

123.   *The 17th Int. Union of Theoretical & Applied Mechanics*, Grenoble, France, Aug. 1988.

124.   *The 20th Midwestern Mechanics Conference*, Purdue University, 1987.

125.   *International Conference on Nonlinear Mechanics*, Shanghai, May, 1985.

126.   *The 2nd National Conference on Plastic Forming*, October 10-15, 1981, Jinan, Shandong.