

# Curriculum Vitae of Fadil Santosa

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## Educational Record

- B.S., Mechanical Engineering, University of New Mexico, May 1976
- M.S. and Ph.D., Theoretical and Applied Mechanics, University of Illinois, Urbana, December 1977 and October 1980

## Professional Experience

### Academic Appointments

- Cornell University, Department of Theoretical and Applied Mechanics,  
Post-Doctoral Research Associate, October 1980 to July 1982  
Lecturer and Research Associate, July 1982 to July 1983  
Assistant Professor, July 1983 to July 1985
- University of Delaware, Department of Mathematical Sciences,  
Assistant Professor, September 1985 to June 1987  
Associate Professor, June 1987 to June 1992  
Professor, June 1992 to May 1996
- University of Delaware, Department of Mechanical Engineering,  
Professor, June 1993 to May 1996
- University of Minnesota, School of Mathematics  
Professor, September 1995–present

### Administrative Appointments

- University of Delaware, Department of Mathematical Sciences,  
Director of Graduate Studies, June 1992 to December 1994
- University of Minnesota, School of Mathematics,  
Minnesota Center for Industrial Mathematics,  
Associate Director, September 1995 to December 2000  
Director, January 2000 to July 2007
- Institute for Mathematics and its Applications  
Associate Director for Industrial Programs, July 1997 to July 2001  
Deputy Director, July 2001 to August 2004  
Director, July 2008 to present

## Visiting positions

- University of Maryland, Department of Mathematics, Visiting Associate Professor, September 1987 to August 1988
- Rutgers University, Department of Mathematics, Visiting Associate Professor, September 1991 to June 1992
- University of Trieste, Department of Mathematical Sciences, Visiting Professor sponsored by the CNR of Italy, June 1993 to August 1993
- Cornell University, Advanced Computing Research Institute, Theory Center, Visiting Professor, January 1995 to August 1995
- Department of Mathematics, University of Florence, Visiting Professor II, May 2004-June 2004
- Department of Mathematics, Simon Fraser University, September 2007 to June 2008
- Pacific Institute of Mathematics – SFU Site, Distinguished Visitor, January 2008 to June 2008

## Honors

SIAM Fellow, 2010; American Mathematical Society Fellow 2012.

## Research Interests

Inverse problems, nondestructive testing, wave phenomena, optics, photonics, optimization, optimal design, homogenization methods, financial mathematics.

## Ph.D. Students

1. Andrew Allers (Ph.D. 1994 Delaware) NSF Graduate Fellow, currently at Jane Street Capital.
2. Peter Kaup (Ph.D. 1995 Delaware), NSF graduate fellow, currently at Lockheed Martin.
3. Svetlana Rudnaya (Ph.D. 1999), currently at Synopsys.
4. Jing Wang (Ph.D. 2002), currently at Pine River Advisors.
5. Grant Erdmann (Ph.D. 2003), currently Air Force Research Lab.
6. Oleg Alexandrov (Ph.D. 2004), currently at NASA.
7. Jian Zhang (Ph.D. 2005), currently at Chinese Academy of Sciences.
8. Thomas Hoft (Ph.D. 2005), currently at University of St Thomas.
9. Mariya Ponomorenko (Ph.D. 2006), currently at ASLM.
10. Todd Wittman (Ph.D. 2006), currently at UCLA Dept. Math.
11. Kevin Collins (Ph.D. 2006), currently at Alliant Tech.
12. Christopher Bemis (Ph.D. 2007), currently at Whitebox Advisors.
13. Hande Metin (Ph.D. 2009), currently at Worcester Institute of Technology.
14. Michael Ashenbeck (Ph.D. 2009), currently at Geoeye.
15. Fanhuan Zhou (Ph.D. 2010), currently at Citi Group.
16. Jose Orozco (Ph.D. 2009), currently at Vision Ease Lens.
17. Madeline Schrier (Ph.D. 2015), currently at Ford Research and Development.
18. Alexandra Ortan (Ph.D. 2015).
19. Josh Wilson (Ph.D. 2017).

## Postdoctoral fellows mentored

1. Bruno Luong (1995-1996)
2. Shari Moskow (1996-1998)
3. Jay Gopalakrishnan (1999-2001)
4. Selim Esedoglu (2000-2002)
5. Chiu-Yen Kao (2004-2006)
6. Carl Toews (2005-2007)
7. Aurelia Minut (2000-2002)
8. Yu Mao (2010-2012)
9. Junshan Lin (2011-2013)
10. Gabriela Martinez (2011-2013)
11. Zhu Wang (2012-present)
12. Krystal Taylor (2012-present)
13. Lingyun Qiu (2013-present)

## Service

### Editorial service

- *SIAM Journal of Applied Mathematics*, member of the editorial board, 1994-2002,
- *Control, Optimisation and Calculus of Variation*, member of the editorial board, 1995-2002,
- *IEEE Computational Science and Engineering*, editor of the Industry Corner column, 1995-2000.
- Springer-Verlag series *IMA Volumes*, co-editor 2001-2004,
- Springer-Verlag book series *Mathematics in Industry*, member of the editorial board, 2002-present,
- *Numerische Mathematik*, member of the editorial board, 2004-present,
- *Inverse Problems*, member of the editorial board, 2005-present,
- *SIAM Review*, section editor of Survey and Review, 2006-2011,
- *European Journal of Applied Mathematics*, member of the editorial board, 2005-present,
- *Inverse Problems and Imaging*, member of the editorial board, 2006-present,
- *Math-in-Industry Case Studies*, member of the editorial board, 2007-present,
- *Springer Graduate Text in Mathematics*, member of the editorial board, 2012-present,
- *Springer Undergraduate Text in Mathematics*, member of the editorial board, 2012-present.

### Mathematics community service

- SIAM Membership Committee (1995-6),
- SIAM Industrial Mathematics Committee (1999-2002),
- Review Committee of INRIA's Program in Scientific Computing (2000),
- SIAM Nominating Committee (2001-2003, 2008-present),
- SIAM Committee on Committees and Appointments (2005-2009).
- SIAM Board of Trustees member (elected position, 2013-present).

## **Professional and Honorary Societies**

Member of Pi Tau Sigma (and past president of New Mexico Chapter), Tau Beta Pi, Phi Eta Sigma, Sigma Xi (and current Minnesota Chapter president), Society of Industrial and Applied Mathematics, American Academy of Mechanics.

## **Patents**

Multifocal optical device design (with J. Wang and R. Gulliver), US patent 11/186468, issued May 2006.

Symbol based decoding of optical codes (with M. Iwen and R. Ward), US patent 13/624,498, issued Mar 2015.

## **Consulting**

I have served as consultant to the following entities

- Symbol Technologies (acquired by Motorola in 2006)
- University of Northern Iowa
- Invarium Inc
- GMAC RFC
- Hongkong Shanghai Banking Corporation
- Vision Ease Lens
- Institute for Basic Sciences (Korea)
- University of Helsinki

## **Current research projects**

1. Symbol based approach to bar code decoding from cameras (with Madeline Schreier)
2. Electro-magnetic wave phenomena in metallic nano-structures (with Josh Wilson and Alexandra Ortan)
3. Integrated classification and dimensionality reduction method (with Krystal Taylor)
4. Inverse problems in magneto-acoustic tomography (with Lingyun Qiu)
5. Resonance phenomena in finite optical structures (with Junshan Lin)

## **Publications**

### **Articles in refereed journals**

1. Inverse scattering techniques in geophysics (with R.W. Carroll), *Applicable Analysis*, **11** (1980), pp. 79-80.
2. Résolution d'un problème qui détermine complètement les données géophysiques (with R.W. Carroll), *C.R. Acad. Sc. Paris, Ser I*, **292** (1981), pp. 23-26.
3. Scattering techniques for a one-dimensional inverse problem in geophysics, (with R.W. Carroll), *Math. Meth. in the Appl. Sci.*, **3** (1981), pp. 145-171.

4. On complete recovery of geophysical data (with R.W. Carroll), *Math. Meth. in the Appl. Sci.*, **4** (1982), pp. 33-73.
5. Numerical scheme for the inversion of acoustical impedance profile based on the Gelfand-Levitan method, *Geophys. J.R. Astr. Soc.*, **70** (1982), pp. 229-243.
6. The inversion of acoustical impedance profile by the method of characteristics (with H. Schwetlick), *Wave Motion*, **4** (1982), pp. 99-110.
7. Stability for the one-dimensional inverse problem via the Gelfand-Levitan equation (with R.W. Carroll), *Applicable Analysis*, **13** (1982), pp. 271-277.
8. Spectral measures and autocorrelation via transmutation (with R.W. Carroll), *Math. Report to the Royal Acad. Science Canada*, **V** (1983), pp. 223-228.
9. Impedance profile recovery from transmission data (with R.W. Carroll), *J. Acous. Soc. Am.*, **76** (1984), pp. 935-941.
10. Determination of a layered acoustic medium via multiple impedance profile inversions form plane wave responses (with W.W. Symes), *Geophys. J.R. Astr. Soc.*, **81** (1985), pp. 175-195.
11. Numerical consideration for the interface resolution in medical ultrasound (with R. Chivers), *Phys. Med. Biol.*, **31** (1986), pp. 819-837.
12. Linear inversion of band-limited reflection seismogram (with W.W. Symes), *SIAM J. Sci. Stat. Comput.*, **7** (1986), pp. 1307-1330.
13. Accuracy of a Lax-Wendroff scheme for the wave equation (with Y.H. Pao), *J. Acoust. Soc. Am*, **80** (1986), pp. 1429-1437.
14. A simple computational scheme for determining the sound speed of an acoustic medium from its impulse response (with P. Sacks), *SIAM J. Sci. Stat. Comput.*, **8** (1987), pp. 501-520.
15. Inversion of band-limited reflection seismograms using stacking velocities as constraints (with W.W. Symes and G. Raggio), *Inverse Problem*, **3** (1987), pp. 477-499.
16. Computation of the Hessian for least-squares solutions of inverse problems of reflection seismology (with W.W. Symes), *Inverse Problem*, **4** (1988), pp. 211-233.
17. High-frequency perturbational analysis of the surface point-source response of a layered fluid (with W.W. Symes), *J. Comp. Phys.*, **74** (1988), pp. 318-381.
18. Reconstruction of blocky impedance profiles from normal-incidence reflection seismograms which are band-limited and miscalibrated (with W.W. Symes), *Wave Motion*, **10** (1988), pp. 209-230.
19. Simultaneous determination of source wavelet and velocity profile using impulsive point-source reflections from a layered fluid (with K. Bube, P. Lailly, P. Sacks, W.W. Symes), *Geophysical J. Royal astr. Soc.*, **95** (1988), pp. 449-462.
20. Transient axially asymmetric response of an elastic plate of finite thickness (with Y.H. Pao), *Wave Motion*, **11** (1989), pp. 271-295.
21. A model for a composite with anisotropic dissipation by homogenization (with W.W. Symes), *Int. J. Solids Structures*, **25** (1989), pp. 381-392.

22. On elastodynamic problems in infinite cylinders, *Q. J. Mech. Appl. Math.*, **42** (1989), pp. 339-361.
23. A backprojection algorithm for electrical impedance imaging (with M. Vogelius), *SIAM J. Appl. Math.*, **50** (1990), pp. 216-243.
24. A dispersive effective medium for wave propagation in periodic composites (with W.W. Symes), *SIAM J. Appl. Math.*, **51** (1991), pp. 984-1005.
25. A computational algorithm for determining cracks from electrostatic boundary measurements (with M. Vogelius), *Int. J. Eng. Science*, **29** (1991), pp. 917-938.
26. A computational quasi-reversibility method for Cauchy problems for Laplace's equation (with M. Klibanov), *SIAM J. Appl. Math.*, **51** (1992), pp. 1653-1675.
27. Stability and resolution analysis of a linearized problem in electrical impedance tomography (with A. Allers), *Inverse Problems*, **7** (1991), pp. 515-533.
28. Shear wave propagation in periodically layered media — an asymptotic theory (with A. Norris), *Wave Motion*, **16** (1992), pp. 33-55.
29. First order corrections to the homogenized eigenvalues of a periodic composite medium (with M. Vogelius), *SIAM J. Appl. Math.*, **53** (1993), pp. 1636–1668.
30. Crack determination from boundary measurements — reconstruction from experimental data (with V. Liepa and M. Vogelius), *Journal of Nondestructive Evaluation*, **53** (1993), pp. 163–174.
31. Resolution and stability analysis of an inverse problem in electrical impedance imaging — dependence on the input current patterns (with D. Dobson), *SIAM J. Appl. Math.*, **54** (1994), pp. 1542–1560.
32. An image enhancement technique for electrical impedance tomography (with D. Dobson), *Inverse Problems*, **10** (1994), pp. 317–334.
33. Optimal design of minimally reflective coatings (with H. Konstanty), *Wave Motion*, **21** (1995), pp. 291–309.
34. Stability in crack determination from electrostatic measurements at the boundary – A numerical investigation (with G. Alessandrini, E. Beretta and S. Vessella), *Inverse Problems*, **11** (1995), pp. L17-L24.
35. Nondestructive evaluation of corrosion damage using electrostatic measurements (with P. Kaup), *Journal of Nondestructive Evaluation*, **14** (1995), pp. 127–135.
36. Recovery of blocky images from noisy and blurred data (with D. Dobson), *SIAM J. Appl. Math.*, **56** (1996), pp. 1181–1198.
37. A computational algorithm for minimizing total variation in image restoration (with Y. Li), *IEEE Transactions on Image Processing*, Special Issue on Nonlinear Image Processing, **5** (1996), pp. 987-995.
38. A level-set approach for inverse problems involving obstacles, *Control, Optimization, and Calculus of Variation*, **1** (1996), pp. 17-33.
39. A method for imaging corrosion damage in thin plates from electrostatic data (with P. Kaup and M. Vogelius), *Inverse Problems*, **12** (1996), pp. 279–293.

40. Nondestructive evaluation of plates using eddy current methods (with D. Dobson), *Int. J. Engng. Sci.*, **36** (1998), pp. 395–409.
41. Quantitative imaging of corrosion in plates by eddy current methods (with B. Luong), *SIAM J. Appl. Math.*, **58** (1998), 1509–1531.
42. An effective nonlinear boundary condition for a corroding surface. Identification of the damage based on electrostatic data (with M. Vogelius and J. Xu), *ZAMM*, **49** (1998), 656–679.
43. Reconstruction of a 2-D binary obstacle by controlled evolution of a level-set (with A. Litman and D. Lesseler), *Inverse Problems*, **14** (1998), pp. 685-706.
44. Efficient Calculation of Jacobian and adjoint vector products in wave propagational inverse problem using automatic differentiation (with T. Coleman and A. Verma), *J. Comp. Phys.*, **157** (2000), pp. 234–255.
45. Wave propagation in a 2-D optical waveguide (with R. Magnanini), *SIAM J. Appl. Math.* **61** (2000), pp. 1237–1252.
46. Multi-pole representation of small acoustic sources (with W. Symes), *Chinese Journal of Mechanics, Series A*, **16** (2000), pp. 15-22.
47. Enhanced electrical impedance tomography via the Mumford-Shah functional (with L. Rondi), *Control, Optimization and Calculus of Variations*, **6** (2001), 517–538.
48. Level set methods for optimization problems involving geometry and constraints. I. Frequencies of a two-density inhomogeneous drum. (with S. Osher), *J. Comp. Phys.*, **171** (2001), pp. 272–288.
49. Control of the wave equation by time-dependent coefficient (with A. Chambolle), *Control, Optimisation and Calculus of Variations*, **8** (2002), Special Volume: A tribute to J.L. Lions, pp. 375-392.
50. Asymptotic analysis and design of diffractive optical elements (with A. Chiareli, D. Misemer and S. Rudnaya), *J. Engineering Math.*, **43** (2002), pp. 255-279
51. Rational design of a diffractive homogenizer for a laser beam (with D. Misemer and S. Rudnaya), *J. Engineering Math.*, **43** (2002), pp. 189-199.
52. A simple model of sheet metal assembly (with K. Hoffman), *SIAM Review*, **45** (2003), pp. 558–573.
53. An analysis of a problem in progressive surface design (with R. Gulliver and J. Wang), *SIAM J. Appl. Math.*, **64** (2003), pp. 277–296.
54. A numerical method for progressive lens design (with J. Wang), *Math. Models Methods Appl. Sciences (M3AS)*, **14** (2004), pp. 619–640.
55. Optimal localization of eigenfunctions in an inhomogeneous medium (with D. Dobson), *SIAM J. Appl. Math.*, **64** (2004), pp. 762–774.
56. Guided waves in a photonic bandgap structure with a line defect (with H. Ammari), *SIAM J. Appl. Math.*, **64** (2004), pp. 2018–2033.
57. Minimax design of optically transparent and reflective coatings (with G. Erdmann), *J. Opt. Soc. Am. A*, **21** (2004), pp. 1730–1739.

58. A topology-preserving level set method for shape optimization (with O. Alexandrov), *J. Comp. Phys.*, **204** (2005), pp. 121–130.
59. An approximate method for scattering by thin structures (with S. Moskow and J. Zhang), *SIAM J. Appl. Math.*, **66** (2005), pp. 187–205.
60. An inverse problem in nondestructive evaluation of spot-welds (with Francini and Hoft), *Inverse Problems*, **22** (2006), pp. 645–661.
61. Applications of hidden Markov models in bar code decoding (with S. Kresic-Juric and D. Madej), *Pattern Recog. Let.*, **27** (2006), pp. 1665-1672.
62. Scattering of electromagnetic waves by thin dielectric structures (with H. Ammari and H. Kang), *SIAM J. Math. Anal.* **38** (2006), pp. 1329-1342.
63. Position registration from voltage measurements (with C. Toews), *Inverse Problems*, **23** (2007), pp. 2271-2288.
64. Maximization of the quality factor of an optical resonator (with C.Y. Kao), *Wave Motion*, **45** (2008), pp. 412-427.
65. Asymptotic and numerical techniques for resonances of thin photonic structure (with J. Gopalakrishnan and S. Moskow), *SIAM J. Appl Math.*, **69** (2008), pp. 37-63.
66. Level set methods for optimization problems involving geometry and constraints II. Optimization over a fixed surface (with Emmanuel Maitre), *J. Comp. Physics.*, **227** (2008), pp. 9596-9611.
67. Simultaneous composition and thickness measurement of paper using terahertz time-domain spectroscopy (with P. Mousavi, F. Haran, D. Jez, and J. Dodge), *Applied Optics*, **48** (2009), 6541-6546.
68. An inverse problem in reaction kinetics (with B. Weitz), *J. Mathematical Chemistry*, **49** (2011), 1507-1520.
69. Analysis of an inverse problem arising in photolithography (with L. Rondi), *Mathematical Models and Methods in Applied Sciences (M3AN)*, **22**, 1150026 [30 pages].
70. Estimation of asset distributions from option prices: Analysis and regularization (with J. Orozco), *SIAM J. Financial Math.*, **3** (2012), 374-401.
71. Error estimates for a bar code reconstruction method (with S. Esedoglu), *Discrete and Continuous Dynamical Systems B.*, **17** (2012), 1889-1902.
72. A symbol-based bar code decoding algorithm (with M. Iwen and R. Ward), *SIAM J. Imaging Science*, **6** (2013), 56-77.
73. Resonances of a Potential Well with a Thick Barrier (with D. Dobson, S. Shipman, and M. Weinstein), *SIAM J. Appl. Math.*, **73** (2013), 1489-1512.
74. Resonances of a Finite One-Dimensional Photonic Crystal with a Defect (with J. Lin), *SIAM J. Appl. Math.*, **73** (2013), 1002-1019.
75. Scattering Resonances for a Two-Dimensional Potential Well with a Thick Barrier (with J. Lin), *SIAM J. Math. Anal.*, **47** (2015), 1458-1488.
76. Analysis of the Magneto-acoustic Tomography with Magnetic Induction (MAT-MI) (with L. Qiu), to appear in *SIAM J. Imaging Sci.*



### Articles in proceedings

1. Review of some exact methods for the solution of the one-dimensional inverse problem, in *Identification and System Parameter Estimation*, G.A. Bekey and G.N. Saridis editors, Pergamon Press, 1983, pp. 951-956.
2. Some transmutation methods in geophysics (with R.W. Carroll), in "Conference on Inverse Scattering: Theory and Applications", J.B. Bednar et al editors, SIAM Publications, Philadelphia, 1983, pp. 233-244.
3. Inversion of impedance from band-limited data (with W.W. Symes), in *Digest. 1983 International Geoscience and Remote Sensing Symposium*, San Francisco, IEEE Catalog no.83-CH-1837-4, Section WP-2, pp. 6.1-6.7.
4. Inverse problems of acoustic and elastic waves (with Y.H. Pao and W.W. Symes) in *Inverse Problems of Acoustic and Elastic Waves*, F. Santosa et al editors, SIAM Publications, Philadelphia, 1984, pp. 274-302.
5. Determination of the sound speed of a one-dimensional inhomogeneous medium from its impulse response at the boundary, in *Developments in Mechanics, Vol. 13: Proceedings of the 19th Midwest Mechanics Conference*, 1985, pp. 367-368.
6. Inverse problem for a layered acoustic wave propagation (with W.W. Symes), in *Mathematical and Computational Methods in Seismic Exploration and Reservoir Modeling*, W. Fitzgibbon editor, SIAM Publications, Philadelphia, 1986, pp. 259-263.
7. Inverse problems in scattering theory (with D. Colton and P. Monk), in *Oakland Conference on Partial Differential Equations and Applied Mathematics*, Bragg and Dettman editors, Longman Scientific and Technical, Essex, 1987, pp. 39-73.
8. Least-squares inversion for velocity profiles from bandlimited data (with W.W. Symes), in *Proceedings of the Society of Exploration Geophysics 27th Annual Meeting, 1987*, pp. 423-426.
9. A computational method for electrical impedance imaging (with M. Vogelius), in *Control of Distributed Parameter Systems 1989*, M. Amouroux and A. El Jai, editors, IFAC Symposia Series, 1990, Number 3, Pergamon Press 1990, pp. 187-192.
10. A dispersive effective medium theory for waves in periodic media, in *Mathematical and Numerical Aspects of Wave Propagation Phenomena*, G. Cohen, L. Halpern, and P. Joly, editors, SIAM Publications, 1991, pp. 671-679.
11. A note concerning boundary effects and long time vibration of layered media (with M. Vogelius), in *Control and Optimal Design of Distributed Parameter Systems*, Lagnese, et al, eds, 1995.
12. Applications of electrical impedance tomography to nondestructive evaluations, Proceedings of the Symposium on Parameter Identification, 1995 ASME 15th Biennial Conference on Mechanical Vibration and Noise, September 1995.
13. A level-set approach for eddy current imaging of defects in a conductive half-space (with Litman and Lesselier), in *Inverse Problems of Wave Propagation and Diffraction*, Chavent and Sabatier, eds, Springer Verlag, Berlin, 1997.
14. Optimal design of a diffractive optical element (with S. Rudnaya and A. Chiarelli), Proceedings of the 4th International Conference on the Mathematical and Computational Aspects of Wave Propagation, DeSanto, ed., SIAM 1998.

15. Semi-automatic differentiation, (with T. Coleman and A. Verma), in *Computational Methods for Optimal Design and Control*, Borggaard et al, eds., Birkhauser, 1998.
16. Imaging corrosion damage in plates, in *3D Electromagnetic Methods*, Spies and Oristaglio, eds., Society of Exploration Geophysicists, 2000.
17. Scattering in a 2-D optical waveguide (with R. Magnanini), in *Analytical and Computational Methods in Scattering and Applied Mathematics*, Santosa and Stakgold, eds, CRC Press, 2000.
18. Application of a micro-genetic algorithm in optimal design of a diffractive optical element (with S. Rudnaya), in *System Modeling and Optimization – Methods, Theory and Applications*, Powell and Scholtes, eds, Kluwer 2000.

### Technical reports

1. Experimental consideration for simulation of seismic exploration (with H. Schwetlick), Cornell ONR/SRO III Report no.19 (1985).
2. Inverse problems of acoustics in fluids and solids, Final report to the Office of Naval Research on an SRO III grant (with Y. H. Pao, L.E. Payne and W.W. Symes), Cornell University, Department of Theoretical and Applied Mechanics, December 1986 (115 pages).
3. An efficient approach to calculate current distributions for electro-deposition of chip interconnections (with M. Vogelius), IMA Preprint, May 2000.

### Books

1. *Inverse Problems of Acoustic and Elastic Waves* (with Y.H. Pao, W.W. Symes and C. Holland co-editors), SIAM Publications, 1984.
2. *An analysis of least-squares velocity inversion* (with W.W. Symes), The Society of Exploration Geophysicists, Geophysical Monograph Series No. 4, 1989.
3. *Analytical and Computational Aspects of Wave Propagation* (with Kleinman, Angell, Colton and Stakgold, co-editors), SIAM Publications, 1993.
4. *Large-scale optimization* Parts I-III,(with Biegler, Coleman and Conn co-editors) IMA Proceedings, Springer, New York, 1997.
5. *Analytical and Computational Methods in Scattering and Applied Mathematics*, (with Stakgold), CRC Press, 2000.
6. *Princeton Companion to Applied Mathematics*, (with Dennis, Glendinning, Higham, Martin, and Tanner), Princeton University Press, 2015 (800 plus pages).

### Recent Talks and Presentations

#### Selected colloquia and seminars

1. Department of Mathematics, Georgia Tech, January 2011
2. Department of Applied Mathematics, University of Washington, February 2011.
3. Boeing, February 2011
4. Department of Mathematics, Zhejiang University, October 2011

5. Department of Mathematics, Purdue University, November 2011
6. Schlumberger Research, January 2012
7. Department of Mathematics, University of North Carolina Greensboro, 2012
8. Department of Mathematics and Statistics, Portland State University, April 2013
9. Exxon Mobil Upstream Research, May 2013
10. Department of Mathematics, University of Southern California, November 2013
11. Lund Center for Control, University of Lund, Sweden, November 2013
12. Department of Mathematics, University of Tennessee, April 2014
13. Fraunhofer Institute for Industrial Mathematics, July 2014
14. Hong Kong Baptist University, October 2014
15. Claremont McKenna College, November 2014
16. Pacific Northwest National Lab, April 2015

#### Recent presentations at scientific meetings

1. Schlumberger internal meeting, one of two invited outside speakers, September 2011.
2. Isaac Newton Institute Program on Inverse Problems, 2011.
3. Beijing International Center for Mathematical Research, Perspectives in Mathematics, (invited speaker), October 2011.
4. Beijing International Center for Mathematical Research, Frontiers of Computational and Applied Mathematics (invited speaker), October 2011.
5. Conference on Inverse Problems in honor of Gunther Uhlmann, Irvine, (invited speaker), June 2012
6. International Conference on Computational Analysis of Inverse Problems and Partial Differential Equations, Florida State, (invited speaker), May 2013
7. Applied Analysis for the Material Sciences, Luminy, France, (invited speaker), May 2013
8. International Conference on Novel Directions in Inverse Scattering, Delaware, (invited speaker), August 2013
9. Conference on Mathematical and Computational Challenges of Wave Propagation and Inverse Problems, (invited speaker), April 2015
10. International Workshop on Mathematics in the Life and Physical Sciences, (invited speaker), Renmin University, Beijing, China, May 2015
11. International Conference on Inverse Problems, Imaging, and Applications, (invited speaker), Zhejiang University, Hanzhou, China, August 2015