Granville Sewell

Education

Ph.D.	1972	Purdue University	Mathematics
M.S.	1977	University of Texas (Austin)	Mechanical Engineering

Professional Experience

Universidad Simon Bolivar	Depto. de Matematicas	1973-1975
Oak Ridge National Laboratory	Engineering Technology	1977-1978
Purdue University	Visiting Faculty	1978-1979
IMSL, Inc.	Software Designer	1979-1983
University of Texas-El Paso	Math. Dept. (Assistant Prof.)	1983-1988
	(Associate Prof.)	1988-2003
	(Full Professor)	2003-2023
Univ. Texas Ctr. High Performance Comp.	Systems Analyst	1990-1991
Univ. Nacional de Tucuman (Argentina)	Fulbright Lecturer	Aug-Nov 1999
Texas A&M University	Visiting Faculty	2004-2006
Visual Numerics, Inc.	Consultant, 300 hours	Jan-Apr-2010
UNAM Queretaro	Teaching on PREI Grant	Oct-Dec-2019

A. Books

5. "Solving Partial Differential Equation Applications with PDE2D," John Wiley & Sons, September 2018.

4. c. "The Numerical Solution of Ordinary and Partial Differential Equations, third edition," World Scientific Publishing Company, 2015.
   b. "The Numerical Solution of Ordinary and Partial Differential Equations, second edition," John Wiley & Sons, 2005.
   a. "The Numerical Solution of Ordinary and Partial Differential Equations," Academic Press, 1988.

3. c. "Computational Methods of Linear Algebra, third edition," World Scientific Publishing Company, 2014.
   b. "Computational Methods of Linear Algebra, second edition," John Wiley & Sons, 2005.
   a. "Computational Methods of Linear Algebra," Ellis Horwood, Ltd., 1990.

2. b. "In the Beginning and Other Essays on Intelligent Design, second edition," Discovery Institute Press, 2015.
   a. "In the Beginning and Other Essays on Intelligent Design," Discovery Institute Press, 2010.

1. "Analysis of a Finite Element Method: PDE/PROTRAN," Springer-Verlag, 1985.

B. Publications

57. "Finite Element Software for Calculating Fluid Flow and Heat Transport for Seamounts," (with V.C.Manea et al) Environmental Modelling and Software 179 (2024) 106129.
56. "Human-engineered Self-replicating Machines," Biocosmos 1 (2023) 12-15.
55. "Solving the Laplace Tidal Equations using Freely Available, Easily Extensible Finite Element Software," (with V.C.Manea) Computers and Geosciences 155 (2021).
54. "Derivation of the Black-Scholes Equation from Basic Principles," MAA College Mathematics Journal 49, number 3 (2018) 212-215.
53. "On 'Compensating' Entropy Decreases," Physics Essays 30 (2017) 70-74.
52. "Numerical Schemes for Pricing Asian Options under State-dependent, Regime-switching, Jump-diffusion Models," (with D.M.Dang and D.Nguyen) Computers and Mathematics with Applications 71 (2016) 443-458.
51. "Numerical Methods applied to Option Pricing Models with Transaction Costs and Stochastic Volatility," (with M.Mariani and I.SenGupta) Quantitative Finance 15, number 8, (2015) 1417-1424.
50. "Numerical Solutions to an Integro-differential Parabolic Problem arising in the Pricing of Financial Options in a Levy Market," (with I.Florescu and M.Mariani) Quantitative Finance 14, number 8, (2014) 1445-1452.
49. "Numerical Schemes for Option Pricing in Regime-Switching Jump Diffusion Models," (with I.Florescu, R.Liu and M.Mariani) International Journal of Theoretical and Applied Finance 16, number 8 (2013).
48. "Pulse Shaping during Raman Seed Amplification for Short Laser Pulses," (with G.Lehmann and K.H.Spatschek) Physical Review E 87, issue 6, (2013).
47. "Entropy and Evolution," Bio-Complexity 2013, 2 (2013) 1-5.
46. "Solving the KPI Wave Equation with a Moving Adaptive FEM Grid," Bulletin of Computational Applied Mathematics 1, (2013) 51-67.
45. "Entropy, Evolution and Open Systems," chapter in "Biological Information: New Perspectives," World Scientific Publishing Co., (2013) 168-178.
44. "Runaway Electron Transport in Turbulent and Resonantly Perturbed Magnetic Topologies of TEXTOR," (with M.Forster, S.Abdullaev, K.Finken, T.Kudyakov, M.Lehnen, O.Willi and Y.Xu), Nuclear Fusion 52, number 8, (2012).
43. "(Free) Software for General Partial Differential Equation Problems in Non-rectangular 2D and 3D Regions," Bulletin of Computational Applied Mathematics 1, number 1, (2012) 27-30.

42. "Superconducting Phase Transistor in Four-terminal Josephson Junctions," (with M.Alidoust and J.Linder), Physical Review B 85, number 14, (2012).

41. "Influence of Bt on the Magnetic Turbulence and on the Runaway Transport in Low-density Discharges," (with T.Kudyakov, S.Abdullaev, S.Bozhenkov, K.Finken, M.Jakubowski, M.Lehnen, O.Willi and Y.Xu), Nuclear Fusion 52, number 2, (2012).

40. "Non-Fraunhofer Interference Pattern in Inhomogeneous Ferromagnetic Josephson Junctions," (with M.Alidoust and J.Linder) Physical Review Letters 108, number 3, (2012).

39. "Solving PDEs in Non-rectangular 3D Regions Using a Collocation Finite Element Method," Advances in Engineering Software 41, number 5, (2010), pp748-753.

38. "Analytical and Numerical Treatment of a Dynamic Crack Model," (with A.Lalegname and A.M. Sändig) International Journal of Fracture 152, number 2, (2008) pp97-125.

37. "Experimental and Theoretical Analyses of Penetration Processes of Externally Applied Rotating Helical Magnetic Perturbation Fields in TEXTRO and HYBTOK-II," (with Y.Kikuchi, et. al.) Plasma Physics and Controlled Fusion 49 (2007) A135-A143.

36. "Intraslab Seismicity and Thermal Stress in the Subducted Cocos Plate beneath Central Mexico," (with V.Manea, M.Manea, V.Kostoglodov), Tectonophysics 420, (2006) 389-408.

35. "Modelling of the Penetration Process of Externally Applied Helical Magnetic Perturbation of the DED on the TEXTOR Tokamak," (with Y.Kikuchi, K.H.Finken, M.Jakubowski, M.Lehnen, D.Reiser and R.C.Wolf, Plasma Physics and Controlled Fusion 48, (2006) 169-183.

34. "Linear Analysis of the Interaction of Rotating Helical Magnetic Perturbations with Tokamak Plasmas Based on the Reduced Two-fluid Model," (with Y.Kikuchi, K.H.Finken, M.Jakubowski, M.Lehnen, D.Reiser, R.C.Wolf), Contributions to Plasma Physics 46 (7-9), (2006) 539-544.

33. "Thermal Models, Magma Transport and Velocity Anomaly Estimation beneath Southern Kamchatka," (with V.C.Manea, M.Manea, V.Kostoglodov) in "Plates, Plumes and Paradigms," Geological Society of America book (2005), chapter 31, p 388.

32. "Thermo-mechanical Model of the Mantle Wedge in Central Mexican Subduction Zone and a Blob Tracing Approach for the Magma Transport," (with V.C.Manea, M.Manea, V.Kostoglodov) Physics of the Earth and Planetary Interiors 149, (2005) 165-186.

31. "Thermal Structure, Coupling and Metamorphism in the Mexican Subduction Zone beneath Guerrero," (with V.C.Manea, M.Manea, V.Kostoglodov, C.Currie) Geophysical Journal International 158, (2004) 775-784.

30. "Modeling of the Field Line Penetration and Force Transfer by the Dynamic Ergodic Divertor of TEXTOR," (with K.Finken, S.Abdullaev, M.Jakubowski, M.Lehnen), Nuclear Fusion 44, (2004), S55-S63.

29. "Modeling Approach to a 3D Simulation of Transport in TEXTOR-DED Laminar Zone with a Finite Element Method," (with M.Kobayashi, D.Reiser, K.Finken, S.Abdullaev) Journal of Nuclear Materials 313-316 (2003), 1056-1060.

28. "Simplified Calculation of Constituent Tidal Currents and Height from HF Radar Profiles across the Mouth of Bays and Sounds," (with R.Fitzgerald and D.Barrick) Proceedings of the IEEE/OES Seventh Working Conference on Current Measurement Technology, 2003.

27. "Modeling Analysis of the Transport Properties in TEXTOR-DED Laminar Zone with A Finite Element Code," (with M.Kobayashi, K.Finken, T.Eich, D.Reiser and S.Abdullaev) Contributions to Plasma Physics 42, number 2-4 (2002) pp163-168.

26. "Scattering of Electromagnetic Waves from One-Dimensionally Rough Surfaces Containing Surface Resonant Structures," (with A.McGurn and R.Fitzgerald) Proceedings of the SPIE 4100, pp14-21 (2000).

25a. "A Mathematician's View of Evolution," The Mathematical Intelligencer 22, number 4, pp5-7 (Fall 2000).

25b. "Can ANYTHING Happen in an Open System?", The Mathematical Intelligencer 23, number 4, pp8-10 (Fall 2001).

24. "Solving Problems in Computational Physics using a General Purpose PDE Solver," (with R.Fitzgerald) Computer Physics Communications 124, pp132-138 (March 2000).

23. "Solution of Ground Water Flow Problems with General Purpose and Special Purpose Computer Codes," (with M.Gribb) Ground Water 36, number 2, pp366-372 (March-April 1998).

22. "Full Vectorial Simulation for Characterizing Loss or Gain in Optical Devices with an Accurate and Automated Finite-Element Method," (with V.Tzolov, M.Fontaine and A.Delage), Applied Optics 36, number 3, pp622-628 (Jan 20, 1997).

21. "Comparison of Two Interactive Finite Element Programs for Analysis of Optical and Microwave Waveguides," (with S.Cvetkovic, F.Fernandez, R.Ettinger, A.Zhao,and J.Davies), IEEE/OSA J. Lightwave Technology, volume 12, number 7, pp1112-1120 (1994).

20. "PDE2D: Easy-to-use Software for General Two-Dimensional Partial Differential Equations," Advances in Engineering Software, volume 17, number 2, pp105-112 (1993).

19. "A Finite Difference Method for a Moving-Interface Diffusion- Reaction Problem," (with G. McMath), Advances in Engineering Software, volume 13, number 3, pp135-147 (May 1991).

18. "Mantle Convection with Internal Heating and Pressure-dependent Thermal Expansivity," (with D. Yuen, A. Leitch), Earth and Planetary Science Letters, 102, pp213-232 (1991).

17. "WAVEGIDE–An Interactive Waveguide Program," (with S. Cvetkovic), Advances in Engineering Software, volume 11, number 4, pp169-175 (October 1989).

16. "Dynamic Mixing in Magma Bodies: Theory, Simulations, and Implications," (with C. Oldenburg, F. Spera, D. Yuen), Journal of Geophysical Research, volume 94, number B7, pp9215-9236 (July 10, 1989).

15. "An Interactive Waveguide Program," proceedings of the Fifth Annual Review of Progress in Applied Computational Electromagnetics pp793-805 (Monterey, Cal., March 1989).

14. "An Expandable, Interactively-Accessible FORTRAN Library," Advances in Engineering Software, volume 11, number 1, pp12-18 (January 1989).

13a. "Plotting Contour Surfaces of a Function of Three Variables," ACM Transactions on Mathematical Software, volume 14, number 1, pp33-41 (March 1988).

13b. "Algorithm 657: Software for Plotting Contour Surfaces of a Function of Three Variables," ACM Transactions on Mathematical Software, volume 14, number 1, pp42-44 (March 1988).

12. "Dynamics of Magma Withdrawal from Stratified Magma Chambers," (with F. Spera, D. Yuen, J. Greer), Geology, volume 14, pp723-726, (September 1986).

11. "The Effects of Excited-State Diffusion and Saturation on the Strong Field Reflection and Transmission Properties of Materials," (with Y. Band), Journal of Chemical Physics, volume 84, number 7, pp3617-3623 (April 1, 1986).

10. "High Rayleigh Number Convections with Strongly Variable Viscosity: A Comparison Between Mean Field and Two-Dimensional Solutions," (with D. Yuen, F. Quareni, U. Christensen), Journal of Geophysical Research, volume 90, number B14, pp12633-12644 (December 10, 1985).

9. "Applications of TWODEPEP," in PDE Software: Modules, Interfaces and Systems, North-Holland, pp225-240 (1984).

8. "LP/PROTRAN, A Problem Solving System for Linear Programming Problems," in Computer Science and Statistics: Proceedings of the Fifteenth Symposium on the Interface, North Holland, pp333-338 (1983).

7. "TWODEPEP, a Small General Purpose Finite Element Program," Angewandte Informatik 4 (West Germany) pp249-253 (1982).

6. "A Finite Element Program with Automatic User-Controlled Mesh Grading," in Advances in Computer Methods for Partial Differential Equations III, IMACS, pp8-10 (1979).

5. "A Model for Fatigue Crack Closure Based on Surface Roughness and Residual Strain," (with H.L.Marcus) Scripta Metallurgica 11, pp521-524 (1977).
4. "The Influence of Underload Time on Crack Growth Retardation of Aluminum Alloys," (with H.L.Marcus) International Journal of Fracture 13, pp247-249 (1977).
3. "Finite Element Solution of Degenerate Interface Problems," (with G. Meyer), in The Mathematics of Finite Elements and Applications II, pp171-181, Academic Press, 1976.
2. "An Adaptive Computer Program for the Solution of div(p(x,y)grad u)= f(x,y,u) on a Polygonal Region," in The Mathematics of Finite Elements and Applications II, pp543-553, Academic Press, 1976.
1. "Mesh Selection for Discrete Solution of Boundary Problems in Ordinary Differential Equations," (with V. Pereyra) Numer. Math. 23, pp261-268 (1975).

C. Invited and Contributed Addresses

35. "PDE2D, Un Software para Ecuaciones Diferenciales Parciales Generales," Universidad de Alcala, Spain, October 13, 2025.
34. "Hydrothermal circulation in oceanic crust along Middle America Trench: insights from numerical modeling," Marina Manea, Granville Sewell, Vlad Manea and Lucian Petrescu, EGU23-4999, presented at the 2023 EGU Meeting, April 23-28, 2023.
33. "Why Evolution is Different," Fifth International Congress of Evolution, Istanbul, May 2, 2017.
32. "Mathematical Finance Applications of PDE2D," American Mathematical Society meeting, Alburquerque, NM, April 6, 2014.
31. "Solving the KPI Wave Equation with a Moving Adaptive FEM Grid," Texas PDE Conference, UTEP, March 2, 2013.
30. "PDE2D: A General Purpose Partial Differential Equation Solver," invited talk at the Institut fuer Laser- and Plasmaphysik, Heinrich Heine Universitat, Dusseldorf, Germany, June 5, 2012.
29. "Puede Pasar Cualquier Cosa en un Sistema Abierto?" invited talk at Centro Cultural Alberto Rouges, sponsored by Fundacion Empresaria de Tucuman and Fundacion Miguel Lillo, Tucuman, Argentina, June 29, 2011.
28. Taught 3 week course "Metodos Computacionales de la Algebra Lineal," Universidad Nacional de Tucuman, Tucuman, Argentina, June 2011.
27. "Entropy, Evolution and Open Systems," presented at symposium "Biological Information: New Perspectives," Cornell University, May 31, 2011.
26. "The IMSL Library of Mathematical and Statistical Routines," invited talk at Rice University Statistics Department, Houston, March 15, 2010.

25. Taught two 3-week courses at Universidad Simon Bolivar, Caracas, Venezuela, July 2008: "Metodos Computacionales de la Algebra Lineal," and "Solucion Numerica de Ecuaciones Diferenciales Parciales."

24. "The PDE2D Collocation Finite Element Method," contributed talk at the SIAM Conference "Analysis of Partial Differential Equations" (PD07), Phoenix, Arizona, Dec 10, 2007.

23. "Un Programa para la Resolucion de Ecuaciones Diferenciales Parciales Generales, con Aplicaciones," invited talk at the UNAM Centro de Geociencias in Queretero, Mexico, May 17, 2007.

22. "Aplicaciones de PDE2D, Un Programa de Propositos Generales que Resuelve Ecuaciones Diferenciales Parciales," invited talk at Universidad Simon Bolivar, Caracas, Venezuela, July 1, 2005.

21. Taught 4 week course "Metodos Computacionales de la Algebra Lineal," Universidad Simon Bolivar, Caracas, Venezuela, June, 2005.

20. "Un Programa para la Resolucion de Ecuaciones Diferenciales Parciales Generales, con Aplicaciones," invited talk at Universidad Nacional Autonoma de Mexico (UNAM), June 13, 2003.

19. "Finite Element Calculation of Normal Modes for Tidal Flow Analyses of HF Radar Data in Corpus Christi Bay and Long Island Sound," (with R.Fitzgerald, D.Barrick and F.Kelly) IEEE International Symposium and USNC/URSI National Radio Science Meeting, June 2002.

18. "Scattering of Electromagnetic Waves from a Semi-Infinite, Inhomogeneous Dielectric Medium," (with R.Fitzgerald) Progress in Electromagnetics Research Symposium 2002.

17. "Solving PDEs in Non-Rectangular 3D Regions Using a Collocation Finite Element Method," invited talk at Texas Tech University, April 11, 2002.

16. Invited talk on PDE2D at University of Dusseldorf (Germany) in June 2000.

15. Invited talk on PDE2D at University of Sheffield (England) in July 2000.

14. "Resolviendo Ecuaciones Diferenciales Parciales por Medio de un Programa General de Elementos Finitos," invited talk at the Instituto de Calculo, Universidad de Buenos Aires (Buenos Aires, Argentina, November 15, 1999)

13. "Solving PDEs in the Classroom," presented at the 8th Annual International Conference on Technology in Collegiate Mathematics (Houston, November 1995)

12. Panelist at workshop "Scalable Software and Problem Solving Environments," Purdue University, Sept 25-26, 1995.

11. Taught 2 week seminar on finite element method at Universidad de Tucuman, Argentina, June 1995, and again June 1996.

10. "PDE2D: An Easy-to-use, Interactive Program for the Numerical Solution of PDEs", presented at the SIAM Annual Meeting (San Diego, July 1994).

9. "PDE2D: A General Purpose FEM Code for 2-D Partial Differential Equations", presented at Lawrence Livermore National Lab. (Livermore, California, March 5, 1993).
8. "A Finite Difference Method for a Moving-Interface Diffusion- Reaction Problem," SIAM Annual Meeting (Chicago, July 1990).
7. "Plotting Contour Surfaces of a Function of Three Variables," SIAM Annual Meeting (Denver, October 1987).
6. "Vectorizing Large Scalar Codes: Experience with PDE/PROTRAN," presented to the University of Minnesota Supercomputer Institute (Minneapolis, Minnesota, May 1987).
5. "Preconditioned Lanczos: A Robust Iterative Method," SIAM conference on Linear Algebra and Applications (Raleigh, NC, May 1985).
4. "Some Numerical Results with a Generalized Conjugate Gradient Method," presented to the University of Texas Center for Numerical Analysis (Austin, Texas, June 1984).
3. "IMSL Software for Differential Equations in One Space Variable," SIAM Sparse Matrix Symposium (Fairfield Glade, Tenn., October 1982).
2. "A Finite Element Program with Automatic, User-Controlled Mesh Grading," 15th Annual Meeting of the Society of Engineering Science (Gainesville, Florida, December 1978).
1. "An Easy-to-Use, Small Finite Element Program which Solves a Large Class of Elliptic, Parabolic and Eigenvalue Problems in General Two-dimensional Regions," Texas Conference on Mathematical Software (Austin, Texas, March 1978).