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Computer Science and Mathematics Division
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Education:

1968 B.S., M.S. mathematics, Polytechnic Institute of New York

1973 Ph.D. mathematics, California Institute of Technology

Ph.D. Thesis: *Essential Central Spectrum and Numerical Range in a von Neumann Algebra* Thesis Supervisor: Professor Charles DePrima

Employment:

4/74-present: Research staff, Computer Science and Mathematics Division,
Oak Ridge National Laboratory

8/87 - 1/89: Visiting Senior Scientist, IBM Bergen Scientific Centre, Norway

9/77-present: Department of Mathematics (Adjunct), University of Tennessee

Honors:

NSF Summer Research Institute on Operator Theory, University of New Hampshire, June 21-August 13, 1976

Invited Papers:

NATO ASI on Disordered Systems, Michigan State University 1981

NATO ASI on Scaling Phenomena in Disordered Systems, Geilo Norway 1985

Fifth Solid State Ionics Conference, Lake Tahoe California 1985

Sixth International Symposium on Fractals in Physics Treiste, Italy 1985

Gordon Research Conference on Solid State Ionics, Wolfeboro N.H. 1986

Japan/USA Boundary Elements Symposium, Palo Alto CA 1990

Special issue of the journal *Mathematical and Computer Modelling* 1991

Special volume *Advances in Boundary Elements* 1993

ICES/IABEM International Conference, Hawaii, August 1995

ASME Mechanics and Materials Conference, Johns Hopkins University, 1996

Special FGM issue of the journal *Engineering Fracture Mechanics* 2001

Invited Seminars: 1993-present

Inst. for Mathematics & Applications	U. Minnesota	Oct. 1993
Dept. of Civil Engineering	U. Minnesota	April 1994
Chemical Engineering Dept.	UC Santa Barbara	April 1996
Dept. of Civil Engineering	UC Davis	April 1996
Marine Technology	Norsk Hydro Research	June 1996
Civil Engineering Dept.	U. of Cincinnati	Feb. 1998
Dept. of Civil Engineering	Politecnico di Milano	March 1998
Mining Technology	CSIR Johannesburg	March 1998
Dept. of Mathematics	U. Manchester	July 1999
Dept. of Mathematics	U. Hertsfordshire	July 1999
Dept. of Engineering	Queen Mary College	July 2000
Mathematics Dept.	Colorado School of Mines	Sept. 2000
Mining Technology	CSIR, Johannesburg	Oct. 2000
Dept. of Civil Engineering	U. Minnesota	Sept. 2002
Mechanical Engineering Dept.	Georgia Tech	Nov. 2001
Civil Engineering Dept.	U. Minnesota	Sept. 2002
Marine Technology	Norsk Hydro Research	June 2003
Civil Engineering Dept.	U. Brescia	July 2003
(Boundary Integral short course, 5 2-hour lectures)		
Elasticity Group	U. Sevilla	July 2003
Mining Engineering	CSIR, Johannesburg	Sept. 2003

Research Interests:

Boundary integral method (especially hypersingular equations), mathematical and computational analysis applied to materials science, engineering, and electrochemistry

Active Collaborations:

Cornell University (computational fracture mechanics), U. Illinois (Symmetric Galerkin, functionally graded materials), Harvard University (interface instability), Colorado School of Mines (functionally graded materials), U. C. Berkeley (Level Set/BEM), CSIR South Africa (fast multipole BEM, mining applications), U. Sevilla (gradient evaluation, functionally graded materials).

Professional:

Member of SIAM, IABEM. Editorial board of *Engineering Analysis with Boundary Elements*. Founding Co-editor, *Electronic Journal of Boundary Elements*.

Journal Publications:

1. Products of Hermitian Operators *Proc. AMS*, **59**, pp. 123-126, 1976.
2. L. J. Gray and D. G. Wilson, Construction of a Jacobi Matrix from Spectral Data *Linear Algebra Its Appl.*, **14**, pp. 131-134, 1976.
3. T. Kaplan and L. J. Gray, Distribution of Vibrational Modes in an Amorphous Linear Chain *Physica*, **83B**, pp. 310-313, 1976.
4. T. Kaplan and L. J. Gray, Off Diagonal Disorder in Random Substitutional Alloys *J. Phys. C*, **9**, pp. L303-307, 1976.
5. T. Kaplan and L. J. Gray, Elementary Excitations in Random Substitutional Alloys *Phys. Rev.*, **14**, pp. 3462-70, 1976.
6. T. Kaplan and L. J. Gray, Disordered Systems with Short-Range Order *J. Phys. C*, **9**, pp. L483-L487, 1976.
7. L. J. Gray and T. Kaplan, Elementary Excitations in Disordered Systems with Short-Range Order *Phys. Rev.*, **15**, pp. 3260-3266, 1977.
8. Jordan Representation for a Class of Nilpotent Operators *Indiana Univ. Math. J.*, **26**, pp. 57-64, 1977.
9. Operators Commuting with a Compact Quasi-affinity *Proc. AMS*, **63**, pp. 263-264, 1977.
10. On Bi-quasitriangular Operators *Proc. AMS*, **64**, pp. 291-294, 1977.
11. R. C. Ward and L. J. Gray, Eigensystem Computation for Skew-Symmetric Matrices and a Class of Symmetric Matrices *ACM Trans. Math. Software*, **4**, pp. 278-285, 1978, and ORNL/CSD -9 Report Union Carbide Nuclear Division May 1976.
12. R. C. Ward and L. J. Gray, The ZD Algorithm to Solve the Eigenvalue Problem for Skew-Symmetric and a Class of Symmetric Matrices *ACM Trans. Math. Software, Algorithms Section*, **4**, pp. 286-289, 1978.
13. T. Kaplan and L. J. Gray, Spectral Functions of Disordered Alloys *Phys. Rev. B*, **17**, pp. 4607-4613, 1978.

14. R. Hemenger, L. J. Gray, and T. Kaplan, Theoretical Optical Absorption for Large Aggregates of Chromophores *J. Chem. Phys.*, **70**, pp. 3324-3332, 1979.
15. T. Kaplan and L. J. Gray, A Comment on Disordered Systems *J. Phys. C*, **12**, pp. L721-724, 1979.
16. L. J. Gray and D. G. Wilson, Nonnegative Factorization of Positive Semi-definite Nonnegative Matrices *Linear Algebra Its Appl.*, **31**, pp. 119-127, 1980.
17. L. J. Gray and C. S. Cheng, A Characterization of Group Divisible Designs and Some Related Results *Ann. Discrete Math.*, **6**, pp. 31-39, 1980.
18. T. Kaplan, P. L. Leath, L. J. Gray, and H. W. Diehl, Self-Consistent Cluster Theory for Systems with Off-Diagonal Disorder *Phys. Rev. B*, **21**, pp. 4230-4246, 1980.
19. L. J. Gray and T. Kaplan, A Self-Consistent Cluster Theory for Random Alloys with Short-Range Order *Phys. Rev. B*, **24**, pp. 1872-1882, 1981.
20. R. Hemenger, T. Kaplan and L. J. Gray, Structure of Amphotericin B Based on Calculations of Optical Spectra *Biopolymers*, **22**, pp. 911-918, 1983.
21. R. Mills, T. Kaplan and L. J. Gray, Analytic Approximation for Random Muffin-Tin Alloys *Phys. Rev. B*, **27**, pp. 3252-3262, 1983.
22. T. Kaplan and L. J. Gray, Self-consistent Approximation for Muffin-Tin Models of Random Substitutional Alloys with Environmental Disorder *Phys. Rev. B*, **29**, pp. 3684-3686, 1984.
23. A. Sen, R. Mills, T. Kaplan and L. J. Gray, Traveling Cluster Approximation for Uncorrelated Amorphous Systems *Phys. Rev. B*, **30**, pp. 5686-5695, 1984.
24. T. Kaplan and L. J. Gray, The Effect of Disorder on a Fractal Model for the AC Response of a Rough Interface *Phys. Rev. B*, **32**, pp. 7360-7366, 1985.
25. L. J. Gray and T. Kaplan, Analytic Continuation and Green's Function Calculations *J. of Physics A* **19** pp. 1555-1565, 1986 and ORNL/TM-6191.

26. S. H. Liu, T. Kaplan and L. J. Gray, AC Response of Fractal Interfaces *Solid State Ionics* **18 & 19** pp. 65-71, 1986.
27. T. Kaplan, L. J. Gray and S. H. Liu, Inverse Cantor Bar Model for Response of a Rough Interface *Phys. Rev. B* **34** pp. 4870-4873, 1986.
28. T. Kaplan, L. J. Gray and S. H. Liu, A Self-Affine Fractal Model for a Rough Interface *Phys. Rev. B* **35**, pp. 5379-5381, 1987.
29. L. J. Gray, G. E. Giles and M. Wendel, Boundary Element Method for Three- Dimensional Heat Transfer in Regions with Symmetry *J. Thermophysics*, **2**, pp 329-334, 1988.
30. Boundary Element Method for Regions with Thin Internal Cavities *Engineering Analysis*, **6**, No. 4, pp. 180-184, 1989.
31. T. Kaplan, M. Aziz and L. J. Gray, Application of Onsager's Reciprocity Relations to Interface Motion During Phase Transformations, *J. Chem. Phys.* **90**, 1133-1140, 1989.
32. J. Drake and L. J. Gray, Parallel Implementation of the Boundary Element Method, **Vector and Parallel Vector Computing**, J. Dongarra, I. Duff, P. Gaffney, and S. McKee, eds., pp. 83-92, Ellis Horwood, 1989.
33. L. J. Gray, L. F. Martha and A. R. Ingraffea, Hypersingular Integrals in Boundary Element Fracture Analysis, *Int. J. Num. Meth. Engng*, **29**, pp. 1135-1158, 1990.
34. L. J. Gray and E. D. Lutz, On the Treatment of Corners in the Boundary Element Method, *J. Computational and Applied Mathematics*, **32**, pp. 369-86, 1990.
35. S. H. Liu, T. Kaplan and L. J. Gray, Geometry and Dynamics of Deterministic Sandpiles, *Phys. Rev. A*, **42**, 3207-3212, 1990.
36. L. J. Gray, G. E. Giles and M. Wendel, Boundary Element Method for Regions with Thin Internal Cavities II, *Engineering Analysis*, **8** pp. 81-88, 1991.
37. Evaluation of Hypersingular Integrals in the Boundary Element Method, *Mathematical and Computer Modelling*, **15** pp. 165-174, 1991.
38. Storage Tank Design, *SIAM Review*, **33**, No. 2, pp. 271-274, 1991.

39. L. Martha, L. J. Gray and A. R. Ingraffea, Three-dimensional Fracture Simulation with a Single-domain, Direct Boundary Element Formulation, *Int. J. Num. Meth. Engng.*, **35**, no. 9, 1907-1922, 1992.
40. L. J. Gray and S. J. Chang, Hypersingular Integral Formulation of Elastic Wave Scattering, *Engineering Analysis with Boundary Elements* **10** No. 4., pp.337-344, 1992.
41. E. D. Lutz, L. J. Gray and A. R. Ingraffea, Use of Simple Solutions for Boundary Integral Methods in Elasticity and Fracture Analysis, *Int. J. Num. Meth. Engng.*, **35**, no. 9, 1737-1752, 1992.
42. Symbolic Computation of Hypersingular Boundary Integrals, *Advances in Boundary Element Methods*, J. H. Kane et al., eds., pp. 157-172, Springer-Verlag, 1993.
43. E. D. Lutz and L. J. Gray, Analytic Evaluation of Singular Integrals without CPV, *Comm. Appl. Num. Meth.*, **9**, pp.909-915, 1993.
44. L. J. Gray and L. L. Manne, Hypersingular Integrals at a Corner, *Engineering Analysis with Boundary Elements* **11**, pp.327-334, 1993.
45. T. Kaplan, M. Aziz and L. J. Gray, Restricted Applicability of Onsager's Reciprocity Relations to Interface Motion, *J. Chem. Phys.*, **99**, pp.8031-8037, 1993.
46. L. J. Gray and C. San Soucie, Hermite Interpolation Algorithm for Evaluating Hypersingular Boundary Integrals, *Int. J. Num. Meth. Engng.*, **36**, 2357-2367, 1993.
47. C. Balakrishna, L. J. Gray and J. H. Kane, Efficient Analytic Integration of Symmetric Galerkin Boundary Integrals Over Curved Elements; Thermal Conduction Formulation, *Computer Methods in Applied Mechanics and Engineering*, **111**, pp.335-355, 1994.
48. C. Zhao, M. Ailor and L. J. Gray, Interior Point Evaluation in the Boundary Element Method, *Engineering Analysis with Boundary Elements* **13**, pp.201-208, 1994.
49. C. Balakrishna, L. J. Gray and J. H. Kane, Efficient Analytic Integration of Symmetric Galerkin Boundary Integrals over Curved Elements; Elasticity Formulation, *Computer Methods in Applied Mechanics and Engineering*, **117**, pp.157-179, 1994.

50. L. J. Gray, D. O. Potyondy, E. D. Lutz, P. A. Wawrzynek, L. F. Martha and A. R. Ingraffea, Crack Propagation Modeling, *Mathematical Models and Methods in Applied Sciences*, **4**, No. 2, pp.179-202, 1994.
51. A Note on Overhauser Elements, *Boundary Element Communications*, **5**, pp.62-65, 1994.
52. L. J. Gray, M. Chisholm and T. Kaplan, Surface Strains in Epitaxial Systems, *Appl. Phys. Lett.*, **66**, pp. 1926-1930, 1995.
53. L. J. Gray, C. Balakrishna and J. H. Kane, Symmetric-Galerkin Fracture Analysis, *Engineering Analysis with Boundary Elements*, **15**, pp. 103-109, 1995.
54. G. H. Paulino, L. J. Gray and V. Zarikian, Hypersingular Residuals – a New Approach for Error Estimation in the Boundary Element Method *I. J. Num. Meth. Engrg.*, **39**, pp.2005-2029, 1996.
55. R. E. Flanery, J. B. Drake and L. J. Gray, Boundary Elements on Distributed Memory Architectures, *Boundary Element Communications* **7**, 57-60, 1996.
56. L. J. Gray, D. Ghosh and T. Kaplan, Evaluation of the Anisotropic Green's Function in Three-Dimensional Elasticity, *Computational Mechanics*, **17**, No. 4, pp.255-261, 1996.
57. L. J. Gray and G. H. Paulino, Symmetric Galerkin Boundary Integral Formulation for Interface and Multi-zone Problems, *I. J. Numer. Meth. Engng*, **40**, pp.3085-3101, 1997.
58. G. H. Paulino and L. J. Gray, Symmetric Galerkin Boundary Integral Fracture Analysis for Plane Orthotropic Elasticity, *Computational Mechanics*, **20**, pp.26–33, 1997.
59. B. D. Semeraro and L. J. Gray, PVM implementation of the Symmetric-Galerkin method, *Engineering Analysis with Boundary Elements*, **19**, pp. 67-72, 1997.
60. L. J. Gray and G. H. Paulino, Crack Tip Interpolation, Revisited, *SIAM J. Appl. Math.* **58**, No. 2, pp. 428-455. 1998.
61. M. A. Sales and L. J. Gray, Evaluation of the Anisotropic Green's Function and its Derivatives, *Computers and Structures*, **69** No. 2, pp.247-254, 1998.

62. L. J. Gray, D. Maroudas and M. N. Enmark, Galerkin Evaluation of Surface Derivatives, *Computational Mechanics*, **22**, No. 2, pp.187–193, 1998.
63. L. J. Gray, D. Maroudas, M. Enmark and E. F. D'Azevedo, Approximate Green's Functions in Boundary Integral Analysis *Engineering Analysis with Boundary Elements*, **23**, No. 3, pp. 267-274, 1998.
64. L. J. Gray and B. E. Griffith, A Faster Galerkin Boundary Integral Algorithm, *Comm. Numer. Meth. Engng.*, **14**, pp. 1109-1117, 1998.
65. M. Aziz, W. Barvosa-Carter, L. J. Gray and T. Kaplan, A Kinetically Driven Interfacial Instability, *Phys. Rev. Lett.*, **81**, No. 7, pp.1445–1448, 1998.
66. M. R. Gungor, L. J. Gray and D. Maroudas, Effects of Mechanical Stress on Electromigration-Driven Transgranular Void Dynamics in Passivated Metallic Thin Films, *Applied Physics Letters*, **73**, No. 26, pp. 3848-3850, 1998.
67. G. H. Paulino and L. J. Gray, Galerkin Residuals for Error Estimation and Adaptivity in the Symmetric Galerkin Boundary Integral Method, *J. ASCE Engng. Mech.*, **125**, No.5, pp. 575-585, 1999.
68. G. J. Van Berkel, G. E. Giles, J. S. Bullock, and L. J. Gray, Computational Simulation of Redox Reactions within a Metal Electrospray Emitter, *Analytical Chemistry*, **71**, No. 23, pp. 5288-5296, 1999.
69. L. J. Gray and T. Kaplan, 3D Galerkin Integration without Stokes' Theorem, *Engineering Analysis with Boundary Elements*, **25**, No. 4-5, pp. 289-296, 2001.
70. J. D. Richardson, L. J. Gray, T. Kaplan, and J. A. L. Napier, Regularized Spectral Multipole BEM for Plane Elasticity, *Engineering Analysis with Boundary Elements*, **25**, No. 4-5, pp. 297-312, 2001.
71. L. J. Gray, A.-V. Phan, T. Kaplan, and G. H. Paulino, Improved Quarter Point Crack Tip Element, *Engineering Fracture Mechanics*, **70**, pp.269-283, 2003.
72. A.-V. Phan, T. Kaplan, L. J. Gray, D. Adelsteinsson, J. A. Sethian, W. Barvosa-Carter, and M. A. Aziz, Modeling a Growth Instability in a Stressed Solid, *Modelling Simul. Mater. Sci. Eng.* **9**, pp. 309-325, 2001.

73. L. J. Gray, T. Kaplan, J. D. Richardson, and G. H. Paulino, Green's Functions and Boundary Integral Equations for Functionally Graded Materials: Heat Conduction, ASME J. Appl. Mech., **70**, pp. 543-549, 2003.
74. A. Sutradhar, G. H. Paulino, and L. J. Gray, Transient Heat Conduction in Functionally Graded Materials, *Engineering Analysis with Boundary Elements*, **26**, pp. 119-132, 2002.
75. P. A. Martin, J. D. Richardson, L. J. Gray, and J. Berger, Green's functions for an Exponentially Graded Elastic Material, *Proc. Royal Soc.*, **48**, pp.1931–1948, 2002.
76. A.-V. Phan, L. J. Gray, T. Kaplan, and T. N. Phan, The Boundary Contour Method for Two-Dimensional Stokes Flow and Incompressible Materials, *Computational Mechanics*, **28**, pp. 425-433, 2002.
77. J. Berger, P. A. Martin, V. Mantič, and L. J. Gray, Fundamental Solutions for Steady-State Heat Transfer in an Exponentially Graded Anisotropic Material, *Z. Math. und Physik*, (in press).
78. A.-V. Phan, J. A. L. Napier, L. J. Gray and T. Kaplan, Symmetric-Galerkin BEM Fracture Modeling with Frictional Contact, *I. J. Numer. Meth. Engng.*, **57**, pp. 835-851, 2003.
79. E. Chisholm, L. J. Gray, and G. E. Giles, Solution of Nonlinear Polarization Boundary Conditions, *E. J. Boundary Elements* (in press).
80. L. J. Gray, J. Glaeser and T. Kaplan, Direct Evaluation of 3D Galerkin Hypersingular Integrals, *SIAM J. Sci. Comp.* (in press).
81. L. J. Gray, A.-V. Phan, and T. Kaplan, Boundary Integral Evaluation of Surface Derivatives, *SIAM J. Sci. Comp.* (submitted).
82. A.-V. Phan, L. J. Gray, T. Kaplan, and J. A. L. Napier, Highly Accurate Stress Intensity Factor Analysis in Frictional Contact Fracture, *Computational Mechanics* (in press).
83. L. J. Gray, A. Griffith, L. Johnson and P. A. Wawrzynek, Galerkin Singular Intgeration for Anisotropic Elasticity, *Electronic J. Boundary Elements*, **1**, <http://tabula.rutgers.edu/EJBE/articles/2003-v1.2/>, pp. 68-94, 2003.

84. A. Sutradhar, G. H. Paulino, and L. J. Gray, Symmetric Galerkin Boundary Element Formulation for Heat Conduction in a Functionally Graded Material, *I. J. Numer. Meth. Engng.* (submitted).
85. Y.-S. Chan, L. J. Gray, T. Kaplan, and G. H. Paulino, Green's functions for a Two-dimensional Exponentially Graded Elastic Medium, Proc. Royal Soc., in press.
86. W. Barvosa-Carter, M. J. Aziz, A.-V. Phan, T. Kaplan, and L. J. Gray, Interfacial Roughening during Solid Phase Epitaxy: Interaction of Dopant, Stress, and Anisotropy Effects, *J. Appl. Phys.* (submitted).

Conference Proceedings:

1. T. Kaplan and L. J. Gray, Self-Consistent Approximations Beyond the CPA- Part II in *Excitations in Disordered Systems*, M. F. Thorpe, ed. pp. 129-146, Plenum, 1982.
2. S. H. Liu, T. Kaplan and L. J. Gray, A Fractal Model for the ac Response of a Rough Interface in **Fractal Aspects of Materials**, R. B. Laibowitz, B. B. Mandelbrot, and D. E. Passoja eds. Materials Research Society, Pittsburgh, 1985.
3. L. J. Gray, T. Kaplan and S. H. Liu, A Fractal Model for Charge Diffusion Across a Rough Interface in **Scaling Phenomena in Disordered Systems**, eds. R. Pym and A. Skjeltorp, Plenum, January 1986.
4. L. J. Gray and G. E. Giles, Comparison Between Boundary Element and Finite Element Methods for an Electrochemical Plating Problem *Proceedings of the BETECH 86 conference*, J.J. Connor and C.A. Brebbia eds. pp. 171-181, 1986.
5. S. H. Liu, T. Kaplan and L. J. Gray, Theory of the AC Response of Rough Interfaces in **Proceedings of the Sixth International Symposium on ‘Fractals in Physics’**, ed. L. Pietronero and E. Tosatti, North Holland, 1987.
6. L. J. Gray, G. E. Giles and J. Bullock, Progress on Boundary Element Techniques for Electroplating Simulation *Boundary Element Techniques: Applications in Fluid Flow and Computational Aspects* (eds. Brebbia C.A. and Venturini W.S.) Computational Mechanics UK, 1987.

7. M. Aziz, T. Kaplan and L. J. Gray, Application of Onsager's Reciprocity Relations to Alloy Solidification, in *Fundamentals of Beam-Solid Interactions and Transient Processing* (eds. M. Aziz, L. Rehn, and B. Stritzker), Materials Research Society, Pittsburgh, 1988.
8. L. J. Gray, A. Askew and G. E. Giles, Boundary Element Method for Contact Heat Transfer *Proceedings of the European Boundary Element Conference* Brussels, Belgium, May 1988, Universite Libre de Bruxelles.
9. L. J. Gray and G. E. Giles, Application of the Thin Cavity Method to Shield Calculations in Electroplating *Proceedings of the Boundary Elements 10 Conference* Southampton, England, September 1988.
10. S. H. Liu, T. Kaplan and L. J. Gray, Theory of the AC Response of Fractal Interfaces, in *Fractal Aspects of Materials: Disordered Systems*, ed. by A. J. Hurd, D. A. Weitz, and B. B. Mandelbrot, Materials Research Society, Pittsburgh, 1989.
11. Numerical Experiments with a Boundary Element Technique for Corners, *Advances in Boundary Elements (Proceedings of the Boundary Elements 11 Conference)*, Vol. 1, pp. 243-252, 1989.
12. L. J. Gray, G. E. Giles, J. Bullock, and P. McKenzie, Electroplating Simulation, *Proceedings of the European Conference on Mathematics in Industry*, (J. Manley, et. al., eds.), pp. 95-105, Kluwer Academic, Stuttgart, 1990.
13. Electroplating Corners, **Computational Engineering with Boundary Elements**, Vol. 1, (S. Grilli, C. A. Brebbia, A. H-D. Cheng, eds.), pp. 63-72, 1990.
14. Hypersingular Integrals and the 2D Helmholtz Equation, *Advances in Boundary Element Methods in Japan and USA*, (M. Tanaka, C. A. Brebbia, R. Shaw, eds.) Computational Mechanics, pp.379-388, 1990.
15. E. Lutz, L. J. Gray and A. R. Ingraffea, An Overview of Integration Methods for Hypersingular Boundary Integrals, *Proceedings of the Boundary Elements XIII Conference*, (C.A. Brebbia, G.S. Gipson, eds.) pp. 913-925, CMP/Elsevier, London, 1990.
16. L. J. Gray, E. D. Lutz, and A. R. Ingraffea, Evaluation of the Boundary Stress Tensor, *Boundary Integral Methods*, L. Morino and R. Piva, eds., pp. 339-348, Springer Verlag, 1991.

17. D. O. Potyondy, L. J. Gray and A. R. Ingraffea, Simulation of 3D Non-planar Fatigue Crack Growth in a Turbine Blade Root, in Computer Technology 1992 (PVP-234), R. S. Gallagher and G. M. Hulbert, eds., pp. 31-42, ASME 1992.
18. L. J. Gray, M. Chisholm and T. Kaplan, Morphological Stability of Thin Films, in **Boundary Element Technology VIII**, H. Pina and C. A. Brebbia, eds., pp.181-190, Computational Mechanics Publications 1993.
19. V. Zarikian, L. J. Gray and G. H. Paulino, Local Error Indicator for Boundary Element Calculations, in **Boundary Element Technology IX**, C. A. Brebbia and A. J. Kassab, eds., pp.253-260, Computational Mechanics Publications 1994.
20. L. J. Gray and G. H. Paulino, On the Expansion for Surface Displacement in the Neighborhood of a Crack Tip, **Computational Mechanics '95**, S. N. Atluri, G. Yagawa, T. A. Cruse, eds., pp. 2896-2901, Springer Verlag, 1995.
21. Boundary Element Simulation of Electromigration, **Boundary Element Technology XII**, J. Frankel, C. A. Brebbia, and M. Aliabadi, eds., pp. 207-216, Computational Mechanics Publications 1997.
22. R. Gungor, L. J. Gray and D. Maroudas, Analysis of Failure in Metallic Thin-film Interconnects Due to Stress and Electromigration-Induced Void Propagation, in Materials Reliability in Microelectronics **VIII**, edited by T. Marieb, J. Brayman, M. A. Korhonen, and J. R. Lloyd, Materials Research Society Symposia Proceedings, **516**, pp.165-170, Materials Research Society, Warrendale PA, 1998.
23. M. R. Gungor, L. J. Gray, S. J. Zhou, and D. Maroudas, Modeling of Failure in Metallic Thin Films Induced by Stress and Electromigration: A Multiscale Computational Analysis, in Multiscale Modeling of Materials, edited by T. Diaz de la Rubia, E. Kaxiras, V. Bulatov, N. M. Ghoniem and R. Phillips, Materials Research Society Symposia Proceedings, **538**, pp.263-268, Materials Research Society, Warrendale PA, 1999.
24. D. Maroudas, M. R. Gungor, H. S. Ho, and L. J. Gray, Modeling of Electromigration-Induced Failure of Metallic Thin Film Interconnects, in Electrochemical Processing in ULSI Fabrication and Interconnect and

Contact Metallization, edited by P. C. Andricacos *et al.*, The Electrochemical Society Proceedings Series, **98-6**, pp.232-243, The Electrochemical Society, Pennington NJ, 1999.

25. L. J. Gray, T. Kaplan, J. D. Richardson, and G. H. Paulino, Boundary Integral Analysis for Functionally Graded Materials, in **Functionally Graded Materials 2000**, Proc. 6th Int. Symposium on Functionally Graded Materials, edited by K. Trumble, K. Bowman I. Reimanis, and S. Sampath, Ceramic Transactions, Volume 114, pp. 501-512 (The American Ceramic Society, Westerville, Ohio, 2001).
26. G. E. Giles, L. J. Gray, J. S. Bullock, and G. J. Van Berk, Numerical Simulation of Anodic Reactions, in **Fundamental Aspects of Electrochemical Deposition Dissolution**, D. Landolt, M. Matlosx, and Y. Sako eds., Vol. 99-33, The Electrochemical Society, NJ 1999.
27. S. Saevik, L. J. Gray, and A.-V. Phan, A Method for Calculating Residual and Transverse Stress Effects in Flexible Pipe Pressure Spirals, *Proc. OMAE 2001*.
28. A.-V. Phan, L. J. Gray, T. Kaplan, and G. H Paulino, Highly Accurate Crack Tip Analysis, in **Advances in Boundary Element Techniques II**, M. Denda, M. H. Aliabadi and A. Charafi, eds., pp. 371-378, Proc. BeTeQ 2001, Rutgers University, NJ, July 16-18, 2001.
29. A.-V. Phan, T. Kaplan, L. J. Gray, W. Barvosa-Carter, M. J. Aziz, Modeling a growth instability in stressed boron doped silicon, Fifth International Conference on Modeling and Simulation of Microsystems, pp. 334-337, Proc. Nanotech 2002, San Juan, Puerto Rico, April 21-25, 2002.
30. A. Sutradhar, G. H. Paulino and L. J. Gray, Three-dimensional transient heat conduction in functionally graded materials, **Proc. IABEM 2002**, Austin, TX, May 28-30, 2002.

Books:

1. G. E. Giles, L. J. Gray and J. Bullock, Simulation of an Electrochemical Plating Process, in **Topics in Boundary Element Research**, Vol. Ch. 7 (Electrical Engineering Applications), C. A. Brebbia editor, pg. 121-141, 1990.

2. Evaluation of singular and hypersingular Galerkin integrals: direct limits and symbolic computation, invited book chapter, **Singular Integrals in Boundary Element Methods**, V. and J. Sladek, eds., Chapter 2, pp. 33-84, Computational Mechanics Publications, 1998.
3. L. J. Gray and G. H. Paulino, **The Symmetric Galerkin Boundary Integral Method**, monograph to be submitted to SIAM (in preparation).

September 8, 2003