



DEPARTMENT OF WOOD SCIENCE AND ENGINEERING
COLLEGE OF FORESTRY

CURRICULUM VITAE

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Title: Professor and Richardson Chair of Wood Science and Forest Products

Personal: Born December 12, 1954 Ridgewood, New Jersey Married, 2 Children

Present Research Activities

Analytical and numerical modeling of wood and composites; Fracture mechanics experiments and analysis of wood and composites including interfacial failure and adhesive failure; Numerical simulations of fracture; Effect of residual stresses due to temperature or moisture in wood and composites; Cracking of coatings and paint systems; Modeling the effective properties of wood and wood-based composites; Processing and properties of natural fibers for reinforcement of polymers; Nanocomposites; Deformation and fracture analysis of wood machining.

Education

Dartmouth College, Hanover, New Hampshire
B.A., Chemistry, June 12, 1977
University of California, Berkeley, Berkeley, California
Ph.D., Chemistry, December 16, 1981 (Advisor: Professor Kenneth Sauer)

Professional Experience

<i>Oregon State University</i> , Corvallis, Oregon	
Professor & Richardson Chair of Wood Science and Forest Products	Jan 2006 to present
Adjunct Professor of Mechanical Engineering	April 2006 to present
<i>University of Utah</i> , Salt Lake City, Utah	
Asst., Assoc. and Full Professor of Materials Science and Engineering	Jul 1986 to Dec 2005
<i>Imperial College of Science & Technology</i> , London, England	
Fulbright Scholar	Jan 1994 to Jul 1994
<i>E. I. duPont de Nemours & Co., Inc.</i> , Experimental Station, Wilmington, Delaware	
Staff Scientist, Central Research & Development Department	Dec 1981 to Sep 1986

Awards and Honors

Visiting Professor, École Polytechnic Fédérale de Lausanne (Summers 1999, 2005, 2007, 2009, 2011)
 George G. Marra Award for Excellence in Research and Writing, Society of Wood Science and Technology (Jun 2007)
 Marie Curie Training Event Instructor, ECCM 11, Rhodes, Greece (Jun 2004)
 Visiting Professor, Ecole Normale Supérieure de Cachan, France (Jun 2002)
 Chairman for Gordon Conference on Composite Materials (Jan 1998)
 Fulbright Fellowship to Imperial College in London, England (Jan-Jul 1994)
 Student's Choice Award for Teaching (University of Utah, 1992)
 Accomplishment Award—Polymer Fracture (duPont, 1986)
 University of California Regents Fellowship (1977-1980)
 American Institute of Chemists Student Award (1977)
 Phi Beta Kappa, Summa Cum Laude, and Hartshorne Medal (Dartmouth College, 1977)

Editing and Editorial Boards

Composites Part A (North American Editor for Applied Science)
 International Journal of Adhesion & Adhesives (Board)
 Polymers & Polymer Composites (Board)
 Journal of Materials: Design and Applications (Board)
 Advanced Composites Letters (Board)

Publications — Recently Submitted

3. A. Sinha, R. Gupta, and J. A. Nairn, “The Effect of Elevated Temperature Exposure on the Fracture Toughness of Solid Wood and Structure Wood Composites,” *Wood Science & Technology*, **submitted** (2011).
2. N. Matsumoto and J.A. Nairn, “Fracture Toughness of Wood and Wood Composites During Crack Propagation,” *Wood and Fiber Science*, **submitted** (2010).
1. J. A. Nairn, “Exact Calculation of Expected Values for Splitting Pairs in Blackjack,” *Methodology and Computing in Applied Probability*, **submitted** (2009).

Publications — Book Chapters

6. J. A. Nairn, “Finite Fracture Mechanics of Matrix Microcracking in Composites,” in *The Application of Fracture Mechanics to Polymers, Adhesives and Composites*, ed., D. R. Moore, Elsevier Science, 207–212 (2004).
5. J. A. Nairn, “Residual Stress Effects in Fracture of Composites and Adhesives,” in *The Application of Fracture Mechanics to Polymers, Adhesives and Composites*, ed., D. R. Moore, Elsevier Science, 193–200 (2004).
4. J. A. Nairn, “Fracture Mechanics of the Microbond and Pull-Out Tests,” in *The Application of Fracture Mechanics to Polymers, Adhesives and Composites*, ed., D. R. Moore, Elsevier Science, 213–218 (2004).
3. J. A. Nairn, “Matrix Microcracking in Composites,” in *Polymer Matrix Composites, vol. 2 of Comprehensive Composite Materials*, eds., edited by R. Talreja and J.-A. E. Manson, Elsevier Science, 403–432 (2000).

2. J. A. Nairn and S. Hu, “Micromechanics of Damage: A Case Study of Matrix Microcracking,” in *Damage Mechanics of Composite Materials*, ed., Ramesh Talreja, Elsevier, Amsterdam, 187–243 (1994).
1. J. A. Nairn and R. J. Farris, “Important Property Divergences,” in *Engineered Materials Handbook, Volume 2: Engineering Plastics*, American Society of Metals, Metals Park, Ohio, 655–658 (1988).

Publications — Refereed Journals

97. J. A. Nairn, “Generalized Crack Closure Analysis for Elements with Arbitrarily-Placed Side Nodes and Consistent Nodal Forces,” *Int. J. Fracture*, **171**, 11–22 (2011). (DOI: 10.1007/s10704-011-9622-x)
96. S. G. Bardenhagen, J. A. Nairn, and H. Lu, “Simulation of dynamic fracture with the Material Point Method using a mixed J-integral and cohesive law approach,” *Int. J. Fracture*, **170**, 49–66 (2011). (DOI 10.1007/s10704-011-9602-1)
95. R. Moon, A. Martini, J.A. Nairn, J. Simonsen, and J. Youngblood, “Cellulose Nanomaterials Review: Structure, Properties and Nanocomposites,” *Chemical Society Reviews*, **40**, 3941–3994 (2011).
94. J. A. Nairn, “Aspect Ratio Requirements for Nanotube-Reinforced, Polymer-Matrix Composites,” *Composites Part A*, **42** (2011). (DOI:10.1016/j.compositesa.2011.08.012)
93. A. Sinha, R. Gupta, and J. A. Nairn, “Thermal degradation of bending properties of structural wood and wood-based composites,” *Holzforschung*, **65**, 221–230 (2011).
92. A. Sinha, R. Gupta, and J. A. Nairn, “Thermal Degradation of Lateral Yield Strength of Nailed Wood Connections,” *J. Materials in Civ. Eng.*, **23**, 812–822 (2011).
91. A. Sinha, J. A. Nairn, and R. Gupta, “Thermal Degradation of the Strength of Plywood and Oriented Strand Board: A Kinetics Approach,” *Wood Science & Technology*, **45**, 315–330 (2011).
90. V. Lemiale, A. Hurmane, and J. A. Nairn, “Material Point Method Simulation of Equal Channel Angular Pressing Involving Large Plastic Strain and Contact Through Sharp Corners,” *Computer Modeling in Eng. & Sci.*, **70** (2010).
89. Y. Leterrier, J. Waller, J.-A.E. Manson, and J.A. Nairn, “Models for Saturation Damage State in Multilayer Coatings,” *Mechanics of Materials*, **42**, 326–334 (2010).
88. J. A. Nairn and E. Le, “Numerical Modeling and Experiments on the Role of Strand-to-Strand Interface Quality on the Properties of Oriented Strand Board,” *International Conference on Wood Adhesives (referred proceedings)*, Lake Tahoe, CA, Sept 28-30, 2009.
87. J. A. Nairn, “Polar Shear Lag Analysis of a Composite of Concentric Cylinders with Longitudinal Cracks: Application to Internal Checking in Wood,” *Composites Part A*, **41**, 850–858 (2009).
86. N. Matsumoto and J. A. Nairn, “The Fracture Toughness of Medium Density Fiber Board (MDF) Including the Effects of Fiber Bridging and Crack-Plane Interference,” *Engineering Fracture Mechanics*, **76**, 2748–2758 (2009).

85. J. A. Nairn, "Analytical and Numerical Modeling of R Curves for Cracks with Bridging Zones," *Int. J. Fracture*, **155**, 167–181 (2009).
84. A. Kutnar, F. A. Kamke, J. A. Nairn, and M. Sernek, "Mode II Fracture Behavior of Bonded Viscoelastic Thermal Compressed Wood," *Wood & Fiber Sci.*, **40**, 362–373 (2008).
83. J. A. Nairn, "A Numerical Study of the Transverse Modulus of Wood as a Function of Grain Orientation and Properties," *Holzforschung*, **61**, 406–413 (2007).
82. J. A. Nairn, "Numerical Implementation of Imperfect Interfaces," *Computational Materials Science*, **40**, 525–536 (2007).
81. J. A. Nairn, "Material Point Method Simulations of Transverse Fracture in Wood with Realistic Morphologies," *Holzforschung*, **61**, 375–381 (2007).
80. Y. Guo and J. A. Nairn, "Three-Dimensional Dynamic Fracture Analysis Using the Material Point Method," *Computer Modeling in Engineering & Sciences*, **16**, 141–156 (2006).
79. J. A. Nairn, "Numerical Modeling of Transverse Compression and Densification in Wood," *Wood and Fiber Science*, **38**, 576–591 (2006).
78. J. A. Nairn, "On the Calculation of Energy Release Rates for Cracked Laminates with Residual Stresses," *Int. J. Fracture*, **139**, 267–293 (2006).
77. L. Xue, O. Borodin, G. D. Smith, and J. A. Nairn, "Micromechanics simulations of the viscoelastic properties of highly filled composites by the material point method (MPM)," *Modelling Simul. Mater. Sci. Eng.*, **14**, 703–730 (2006).
76. S. Guo, D. A. Dillard, and J. A. Nairn, "Effect of residual stress on the energy release rate of wedge and DCB test specimens," *Int. J. Adhesion & Adhesives*, **26**, 285–294 (2006).
75. M. Huang, C. Boone, M. Roberts, D. E. Savage, M. G. Lagally, N. Shaji, H. Qin, R. Blick, J. A. Nairn, and F. Liu, "Nanomechanical Architecture of Strained Bi-layer Thin Films: from design principles to experimental fabrication," *Advanced Materials*, **17**, 2860–2864 (2005).
74. O. Borodin, G. D. Smith, D. Bedrov, J. A. Nairn, and S. G. Bardenhagen, "Multiscale Modeling of Viscoelastic Properties of Polymer Nanocomposites," *J Polym Sci Part B: Polym Phys*, **43**, 1005–1013 (2005).
73. T. J. Kemp, K. N. Bachus, J. A. Nairn, and D. R. Carrier, "Functional trade-offs in the limb bones of dogs selected for running versus fighting," *Journal of Experimental Biology*, **208**, 3475–3482 (2005).
72. M. Huang, J. A. Nairn, F. Liu, and M. G. Lagally, "Mechanical Stability of Ultrathin Ge/Si Film on SiO₂: The Effects of Si/SiO₂ Interface," *J. Applied Physics*, **97**, 116108–116112 (2005).
71. J. A. Nairn, "Simulation of Crack Growth in Ductile Materials," *Engr. Fract. Mech.*, **72**, 961–979 (2005).
70. J. A. Nairn, "Generalized Shear-Lag Analysis Including Imperfect Interfaces," *Advanced Composite Letters*, **13**, 263–274 (2004).

69. Y. Guo and J. A. Nairn, "Calculation of J -Integral and Stress Intensity Factors using the Material Point Method," *Computer Modeling in Engineering & Sciences*, **6**, 295–308 (2004).
68. J. A. Nairn, "Material Point Method Calculations with Explicit Cracks," *Computer Modeling in Eng. & Sci.*, **4**, 649–664 (2003).
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66. M.-H. Han and J. A. Nairn, "Hygrothermal Aging of Polyimide Matrix Composite Laminates," *Composites Part A*, **34**, 979–986 (2003).
65. T. Kislev, G. Marom, L. Berglund, R. Joffe, J. A. Nairn, and H. D. Wagner, "On the Nature of Opaque Cylindrical Regions Formed at Fiber Break Sites in a Fragmentation Test," *Adv. Comp. Letts*, **11**, 7–13 (2002).
64. D.-A. Mendels, Y. Leterrier, J.-A. E. Manson, and J. A. Nairn, "The Influence of Internal Stresses on the Mircobond Test II: Physical Aging and Adhesion," *J. Comp. Mat.*, **36**, 1655–1676 (2002).
63. Ben W. Kim and John A. Nairn, "Experimental Verification of the Effects of Friction and Residual Stress on the Analysis of Interfacial Debonding and Toughness in Single Fiber Composites," *J. Mater Sci.*, **37**, 3965–3972 (2002).
62. Ben W. Kim and John A. Nairn, "Observations of Fiber Fracture and Interfacial Debonding Phenomena Using the Fragmentation Test in Single Fiber Composites," *J. Comp. Mat.*, **36**, 1825–1858 (2002).
61. H. Tan and J. A. Nairn, "Hierarchical Adaptive Material Point Method in Dynamic Energy Release Rate Calculations," *Comput. Meths. Appl. Mech. Engrg.*, **191**, 2095–2109 (2002).
60. J. A. Nairn, "Fracture Mechanics of Composites with Residual Stresses, Traction-Loaded Cracks, and Imperfect Interfaces," *Comp. Sci. & Tech*, **61**, 2159–2167 (2001).
59. J. A. Nairn and D.-A. Mendels, "On the Use of Planar Shear-Lag Methods for Stress-Transfer Analysis of Multilayered Composites," *Mechanics of Materials*, **33**, 335–362 (2001).
58. S. Zhandarov, E. Pisanova, E. Mäder, and J. A. Nairn, "Investigation of Load Transfer Between the Fiber and the matrix in Pull-Out Tests with Fibers Having Different Diameters.," *J. Adhesion Sci. & Tech.*, **15**, 205–222 (2001).
57. J. A. Nairn, "Analytical Fracture Mechanics Analysis of the Pull-Out Test Including the Effects of Friction and Thermal Stresses," *Adv. Comp. Letts.*, **9**, 373–383 (2000).
56. J. A. Nairn, "Exact and Variational Theorems for Fracture Mechanics of Composites with Residual Stresses, Traction-Loaded Cracks, and Imperfect Interfaces," *Int. J. Fract.*, **105**, 243–271 (2000).
55. S.-R. Kim and J. A. Nairn, "Fracture Mechanics Analysis of Coating/Substrate Systems Subjected to Tension or Bending Loads II. Experiments in Bending," *Engr. Fract. Mech.*, **65**, 595–607 (2000).
54. S.-R. Kim and J. A. Nairn, "Fracture Mechanics Analysis of Coating/Substrate Systems Subjected to Tension or Bending Loads I: Theory," *Engr. Fract. Mech.*, **65**, 573–593 (2000).

53. J. A. Nairn, "Energy Release Rate Analysis for Adhesive and Laminate Double Cantilever Beam Specimens Emphasizing the Effect of Residual Stresses," *Int. J. Adhes. and Adhes.*, **20**, 59–70 (2000).
52. X.-F. Zhou, J. A. Nairn, and H. D. Wagner, "Fiber-Matrix Adhesion From the Single-Fiber Composite Test: Nucleation of Interfacial Debonding," *Composites*, **30**, 1387–1400 (1999).
51. C. H. Liu and J. A. Nairn, "Analytical Fracture Mechanics of the Microbond Test Including the Effects of Friction and Thermal Stresses," *J. of Adhes. and Adhesives.*, **19**, 59–70 (1999).
50. A. Paipetis, Y. C. Liu, C. Galiotis, and J. A. Nairn, "Stress Transfer from the Matrix to the Fiber in a Fragmentation Test: Raman Experiments and Analytical Modeling," *J. Comp. Mat.*, **33**, 377–399 (1999).
49. C. H. Liu and J. A. Nairn, "Using the Essential Work of Fracture Method for Studying Physical Aging in Thin Ductile Polymeric Films," *Polym. Sci. & Engr.*, **38**, 186–193 (1998).
48. J. A. Nairn, "Fracture Mechanics of Composites with Residual Thermal Stresses," *J. Appl. Mech.*, **64**, 804–810 (1997).
47. H. D. Wagner and J. A. Nairn, "Thermal Residual Stresses in Three Concentric Transversely Isotropic Cylinders: Application to Thermoplastic Matrix Composites Containing a Transcrystalline Interphase," *Comp. Sci. & Tech.*, **57**, 1289–1302 (1997).
46. J. A. Nairn, "On the Use of Shear-Lag Methods for Analysis of Stress Transfer in Unidirectional Composites," *Mech. of Materials*, **26**, 63–80 (1997).
45. J. A. Nairn and Y. C. Liu, "On the Use of Energy Methods For Interpretation of Results from Single-Fiber Fragmentation Experiments," *Comp. Interfaces*, **4**, 241–267 (1996).
44. J. A. Nairn and Y. C. Liu, "Stress Transfer into a Fragmented, Anisotropic Fiber Through an Imperfect Interface," *Int. J. Solids Structures*, **34**, 1255–1281 (1997).
43. J. A. Nairn and H. D. Wagner, "A Revised Shear-Lag Analysis of an Energy Model for Fiber-Matrix Debonding," *Adv. Comp. Letts.*, **5**, 131–135 (1996).
42. M. Detasses, E. Frydman, D. Vrieling, X. F. Zhou, J. A. Nairn, and H. D. Wagner, "Interface Toughness in Fiber Composites by the Fragmentation Test," *Composites*, **27A**, 769–773 (1996).
41. T. W. Chou, S. L. Phoenix, and J. A. Nairn, "Micromechanical Modeling of Polymeric Composites," *Journal of Materials*, **48**, 53–57 (1996).
40. J. A. Nairn, Y. Ching Liu, and C. Galiotis, "Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to Raman Data and the Single-Fiber Fragmentation Test," *ASTM STP 1290*, 47–65 (1995).
39. H. W. Kim, M. A. Grayson, and J. A. Nairn, "The Effect of Hygrothermal Aging on the Microcracking Properties of Some Carbon Fiber/Polyimide Laminates," *Adv. Comp. Letters*, **4**, 185–188 (1995).
38. H. D. Wagner, J. A. Nairn, and M. Detassis, "Toughness of Interfaces from Initial Fiber-Matrix Debonding in a Single-Fiber Composite Fragmentation Test," *Applied Comp. Mater.*, **2**, 107–117 (1995).

37. R. J. Scheer and J. A. Nairn, "A Comparison of Several Fracture Mechanics Methods for Measuring Interfacial Toughness with Microbond Tests," *J. Adhesion*, **53**, 45–68 (1995).
36. P. R. Stone and J. A. Nairn, "Interfacial Toughness and its Effect on Compression Strength in Polycarbonate/Carbon Fiber Composites," *Polymer Composites*, **15**, 197–205 (1994).
35. J. A. Nairn, S. Hu, and J. S. Bark, "A Critical Evaluation of Theories for Predicting Microcracking in Composite Laminates," *J. Mat. Sci.*, **28**, 5099–5111 (1993).
34. S. Hu, J. S. Bark, and J. A. Nairn, "On the Phenomenon of Curved Microcracks in $[(S)/90_n]_s$ Laminates: Their Shapes, Initiation Angles, and Locations," *Comp. Sci. & Tech.*, **47**, 321–329 (1993).
33. J. B. Ha and J. A. Nairn, "Compression Failure Mechanisms of Unidirectional Single-Ply Composites," *SAMPE Quarterly*, **23**, 29–36 (1992).
32. R. J. Scheer and J. A. Nairn, "Variational Mechanics Analysis of the Stresses and Failure in Microdrop Debond Specimens," *Composites Engineering*, **2**, 641–654 (1992).
31. J. A. Nairn and S. Hu, "The Initiation and Growth of Delaminations Induced by Matrix Microcracks in Laminated Composites," *Int. J. Fract.*, **57**, 1–24 (1992).
30. J. A. Nairn and S. Hu, "The Formation and Effect of Outer-Ply Microcracks in Cross-Ply Laminates: A Variational Approach," *Eng. Fract. Mech.*, **41**, 203–221 (1992).
29. J. A. Nairn, "A Variational Mechanics Analysis of the Stresses Around Breaks in Embedded Fibers," *Mech. of Materials*, **13**, 131–154 (1992).
28. S. Liu and J. A. Nairn, "The Formation and Propagation of Matrix Microcracks in Cross-Ply Laminates During Static Loading," *J. Reinf. Plast. & Comp.*, **11**, 158–178 (1992).
27. J. A. Nairn and S. R. Kim, "A Fracture Mechanics Analysis of Multiple Cracking in Coatings," *Engr. Fract. Mech.*, **42**, 195–208 (1992).
26. J. A. Nairn, "Fracture Mechanics of Unidirectional Composites," *J. Reinf. Plast. & Comp.*, **9**, 91–101 (1990).
25. J. A. Nairn, S. Liu, H. Chen, and A. R. Wedgewood, "Longitudinal Splitting in Epoxy and K-Polymer Composites: Shear-Lag Analysis Including the Effect of Fiber Bridging," *J. Comp. Mat.*, **25**, 1086–1107 (1990).
24. A. S. Saleemi and J. A. Nairn, "The Plane-Strain Essential Work of Fracture as a Measure of the Fracture Toughness of Ductile Polymers," *Polym. Eng. and Sci.*, **30**, 211–218 (1990).
23. J. A. Nairn, "The Measurement of Polymer Viscoelastic Response During an Impact Experiment," *Polym. Eng. & Sci.*, **29**, 654–661 (1989).
22. J. A. Nairn, "The Strain Energy Release Rate of Composite Microcracking: A Variational Approach," *J. Comp. Mat.*, **23**, 1106–1129 (1989). (see errata: *J. Comp. Mat.*, **24**, 233 (1990)).
21. J. A. Nairn, "Fracture Mechanics of Unidirectional Composites Using the Shear-Lag Model II: Experiment," *J. Comp. Mat.*, **22**, 589–600 (1988).

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19. J. A. Nairn, "Transverse Fracture in Unidirectional Graphite/Polysulfone Composites," *J. Comp. Mat.*, **21**, 798–808 (1987).
18. J. A. Nairn and P. Zoller, "The Development of Residual Thermal Stresses in Amorphous and Semicrystalline Thermoplastic Matrix Composites," *ASTM STP 937*, 328–341 (1987).
17. J. A. Nairn, "Thermoelastic Analysis of Residual Stresses in Unidirectional, High Performance Composites," *Polym. Comp.*, **6**, 123–130 (1985).
16. J. A. Nairn and P. Zoller, "Matrix Solidification and the Resulting Residual Thermal Stresses in Composites," *J. Mat. Sci.*, **20**, 355–367 (1985).
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Publications — Conference Proceedings and Contract Reports

37. J. A. Nairn and N. Matsumto, "Fracture Modeling of Crack Propagation in Wood and Wood Composites Including Crack Tip Processes and Fiber Bridging Mechanics," *12th Int. Conf. of Fracture*, Ottawa, CA, July 12-17, 2009.
36. N. Matsumto and J. A. Nairn, "Fracture Toughness of MDF and other Materials with Fiber Bridging," *Proc. 22nd Ann. Tech. Conf. of the Amer. Soc. of Composites*, Seattle, WA, September 17-19, 2007.
35. J.A. Nairn, "Numerical Modeling of Deformation and Fracture of Wood Including Heterogeneity and Anisotropy," *COST Action E35 Meeting*, Lausanne, Switzerland, May 21-23, 2007.
34. J. A. Nairn, "Numerical Simulation of Transverse Fracture in Wood," *World Conf. Timber Engineering*, Portland, OR, August 6-10, 2006.
33. J. A. Nairn and Y. Guo, "Material Point Method Calculations With Explicit Cracks, Fracture Parameters, And Crack Propagation," *Int. Conf. on Fracture 11*, Turin (Italy), March 20-25, 2005.
32. O. Borodin, G. D. Smith, D. Bedrov, S. G. Bardenhagen, and J. A. Nairn, "Dynamic, Transport, and Mechanical Properties of Polymer Nanocomposites and Nanocomposite Solid Polymer Electrolytes," *Nanotech 2004*, Boston, MA, March 7-11, 2004.
31. Y. Leterrier, C. Fischer, L. Médico, F. Demarco, J.-A. E. Månson, P. Bouten, J. DeGoede, and J. A. Nairn, "Mechanical properties of transparent functional thin films for flexible displays," *Proc. 46th Ann. Tech. Conf. Soc. Vacuum Coaters*, San Francisco, CA, May 3-8, 2005.
30. J. A. Nairn, C.-H. Liu, D.-A. Mendels, and S. Zhandarov, "Fracture Mechanics Analysis of the Single-Fiber Pull-Out Test and the Microbond Test Including The Effects of Friction and Thermal Stresses," *16th Ann. Mtg. of the Amer. Soc. Composites*, Blacksburg, VA, Sept 9-12, 2001.
29. D.-A. Mendels, S. A. Page, Y. Leterrier, J.-A. E. Månson, and J. A. Nairn, "A Modified Double lap-Shear Test As A Mean To Measure Intrinsic Properties of Adhesive Joints," *Proc. of ECCM 9*, Brighton, UK, June 4–7, 2000.

28. J. A. Nairn, "Fracture Mechanics of Composites with Residual Stresses, Traction-Loaded Cracks, and Imperfect Interfaces," *Proc. 2nd ESIS TC4 Conf. on Polymers and Composites*, Les Diablerets, Switzerland, Sep. 13–15, 1999.
27. J. A. Nairn, "Mechanical Modeling and Internal Stress Calculations in Filled Polymers," *Eurofillers*, Lyon, France, September 6–9, 1999.
26. J. A. Nairn and M. H. Han, "Hygrothermal Aging of Polyimide Matrix Composite Laminates," *Proc. Int. Conf. Comp. Mat. 12*, Paris, France, July 5–9, 1999.
25. J. A. Nairn, "Applications of Finite Fracture Mechanics for Predicting Fracture Events in Composites," *Fifth Int'l Conf. on Deformation and Fracture of Composites*, London, UK, March 18–19, 1999.
24. H. D. Wagner, X.-F. Zhou and J. A. Nairn, "Interface Toughness of Single-Fiber Composites," *First Hellenic Conference on Composite Materials and Structures*, Xanthi, Greece, July 2–5, 1997.
23. J. A. Nairn, "Some New Variational Mechanics Results on Composite Microcracking," *Proc. 10th Int'l Conf. on Comp. Mat.*, **I**, 423–430 (1995).
22. J. A. Nairn and T. Jiang, "Measurement of the Friction and Lubricity Properties of Contact Lenses," *Proceedings of ANTEC '95*, Boston, MA, May 7–11, 1995.
21. J. A. Nairn and R. J. Scheer, "A Simple Fracture Mechanics Method for Measuring the Interfacial Toughness with Microbond Tests," *Third Int'l Conf. on Deformation and Fracture of Composites*, 616–625 (1995).
20. J. A. Nairn, "A Bessel Function Analysis of Stress Transfer From the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," *25th ISRAEL Conference on Mechanical Engineering*, Technion, Haifa, Israel, May 25–26, 1994.
19. J. A. Nairn, "Using the Essential Work of Fracture Method for Studying Physical Aging in Thin, Ductile Polymeric Films," *Deformation, Fracture, and Yield of Polymers*, Cambridge, UK, April 11–14, 1994.
18. J. A. Nairn, S. I. Harper, and W. D. Bascom, "Effect of Fiber, Matrix, and Interphase on Carbon Fiber Composite Compression Strength," *NASA Contractor Report CR 4601* (1994).
17. J. A. Nairn, "Material Performance: Micromechanical Modeling of Composite Fracture," *First International Workshop of Composite Materials for Offshore Operations*, Houston, TX October 26–28, 1993.
16. J. A. Nairn, "Microcracking, Microcrack-Induced Delamination, and Longitudinal Splitting of Advanced Composite Structures," *NASA Contractor Report CR 4472* (1992).
15. J. A. Nairn, S. Hu, and J. S. Bark, "Master Plot Analysis of Microcracking in Graphite/Epoxy and Graphite/PEEK Laminates," *Proc. of the 3rd NASA Advanced Composite Tech. Conf.*, Long Beach, CA, June 8–11, 1992.
14. P. Shankar, W. D. Bascom, and J. A. Nairn, "The Effect of Mixed Mode Precracking on the Mode I Fracture of Composite Laminates," *Proc. of the 3rd NASA Advanced Comp. Tech. Conf.*, Long Beach, CA, June 8–11, 1992.

13. S. Hu and J. A. Nairn, "On the Thermally-Induced Residual Stresses in Thick Fiber-Thermoplastic Matrix (PEEK) Cross-Ply Laminated Plates," *Proc. of the 9th DOD/NASA/FAA Conf. on Fibrous Composites in Structural Design*, **III**, 1447–1455 (1991).
12. R. J. Scheer and J. A. Nairn, "Variational Mechanics Analysis of the Stresses in Microdrop Debond Specimens," *Proc. 8th Int'l Conf. on Comp. Mat.*, 29-C–38-C (1991).
11. J. A. Nairn, S. Hu, S. Liu, and J. S. Bark, "The Initiation, Propagation, and Effect of Matrix Microcracks in Cross-Ply and Related Laminates," *Proc. of the 1st NASA Advanced Composite Tech. Conf.*, Seattle, WA, Oct. 29 to Nov. 1, 1990.
10. W. D. Bascom, J. A. Nairn, and D. J. Boll, "Studies of Fiber-Matrix Adhesion on Compression Strength," *Proc of the 1st NASA Advanced Comp. Tech. Conf.*, Seattle, WA, Oct. 29 to Nov. 1, 1990.
9. S. Liu and J. A. Nairn, "Fracture Mechanics Analysis of Composite Microcracking: Experimental Results in Fatigue," *Proc. of the Amer. Soc. of Comp.*, 5th *Tech. Conf.*, 287–295 (1990).
8. J. A. Nairn, "The Initiation of Microcracking in Cross-Ply Laminates: A Variational Mechanics Analysis," *Proc. of the 3rd Tech. Conf. of the Amer. Soc. of Composites*, Seattle, WA, September, 1988.
7. A. S. Saleemi and J. A. Nairn, "The Essential Work of Fracture Technique as Applied to Toughened Nylon," *Polymer Preprints*, **29**, 155–156 (1988).
6. J. A. Nairn, "Fracture Mechanics of Unidirectional Composites Containing an Elliptical Hole," *Proc. of the 6th Int. Conf. on Comp. Mat.*, **3**, 200–208 (1987).
5. J. A. Nairn, "Fracture Mechanics of Unidirectional Composites," *Proc. of the 2nd Tech. Conf. of the Amer. Soc. of Composites*, 58–65 (1987). (Revised and reprinted in *J. Reinf. Plast. & Comp.* – see Refereed Papers, No. 26).
4. A. R. Wedgewood, K. B. Su, and J. A. Nairn, "Toughness Properties and Service Performance of High Temperature Thermoplastics and Their Composites," *19th Int'l SAMPE Tech. Conf.*, **19**, 454–467 (1987).
3. J. A. Nairn and A. R. Wedgewood, "Flexural Fatigue of Uniaxial, Glass-Reinforced Amorphous Thermoplastics," *Polymer Preprints*, **26**, 145–146 (1985).
2. J. A. Nairn and P. Zoller, "Residual Thermal Stresses in Semicrystalline Thermoplastic Matrix Composites," *Proc. of the 5th Int. Conf. on Comp. Mat.*, 931–946 (1985).
1. J. A. Nairn, "Orientation and Energy Transfer Studies on Chlorophyll in the Photosynthetic Membrane," *Ph.D. Thesis, Department of Chemistry, University of California, Berkeley* (1981).

Publications — Computers, Educational Software, and Genealogy

10. J. A. Nairn, “NairnFEA and NairnMPM” – Open source finite element and material point method calculation software. Entire source code freely available with complete documentation, updated November, 2011.
Web Site: <http://code.google.com/p/nairn-mpm-fea/>.
9. J. A. Nairn, “OSULaminates” – A Java application for laminate plate theory calculations. Distributed as free software and use in courses, updated January, 2011.
Web Site: <http://woodscience.oregonstate.edu/faculty/Nairn/Software.htm>.
8. J. A. Nairn, “NairnFEAMP” – Finite Element and Material Point Method for Macintosh OS X. Distributed as free application software, updated December, 2010.
Web Site: <http://oregonstate.edu/~nairnj/NairnFEAMP/>.
7. J. A. Nairn, “JANFEA” – Finite Element and Material Point Method for the Macintosh. Distributed as free software, but now replaced by NairnFEAMP (above), updated October 2007.
Web Site: <http://oregonstate.edu/~nairnj/JANFEA/>.
6. J. A. Nairn, “GEDitCOM II,” A Macintosh application for genealogy (Sold commercially),
Web Site: <http://www.geditcom.com>.
5. J. A. Nairn, “GEDitCOM: Programmable Genealogy Software,” *The Computer Genealogists*, **7**, 1 (1998).
4. J. A. Nairn, “Lattice 7.1,” A Macintosh application for Monte Carlo simulation of the conformations of polymer molecules (Distributed free as courseware), Web Site: <http://www.mse.utah.edu/~nairn/RSAC/LATDHome.html>.
3. J. A. Nairn, “Utah Laminates 4.0,” A Macintosh application for laminated plate theory calculations (Sold commercially), Web Site: <http://www.geditcom.com/ulam>.
2. J. A. Nairn, “The Help Manager System,” A Macintosh utility for creating on-line help and educational systems (Licensed commercially).
1. J. A. Nairn, “All About Scrolling Windows,” *MacTutor*, **5**, 21 (1989).

Current Research Projects

5. J. Simonsen, J. A. Nairn, and R. Moon, “USDA-FS,” Developing Design Models for Cellulose Nanocrystal Composites, \$299,740, 5 years, 9/1/2011-8/31/2016.
4. J. A. Nairn, “3A Composites,” Fracture and Durability of Balsa-Core Composites, \$64,473, 2 years, 1/10/2011-6/30/2012.
3. F. A. Kamke, L. Muszyński, and J. A. Nairn, “Investigation of micro-scale wood-adhesive interaction,” NSF UICRC on Wood Based Composites, \$183,000, 3 years, 10/1/2010-9/30/2013.
2. J. A. Nairn, “Experiments and Modeling for Orthogonal Cutting of Wood-Based Composites,” WUR, \$45,500, 2 years, 9/1/09-8/31/12.
1. J. A. Nairn and L. Muszyński, “Morphology Based Modeling of Micro-Mechanics and Failure Mechanisms in Bio-Materials with Polymer Matrices,” USDA NRI, \$397,312, 3 years, 9/1/08-8/31/12.

Research Grants Pending

1. J. A. Nairn and J. Otaigbe, “NSF,” Collaborative Research: Wood Fiber Reinforced Polymers using Ring-Opening Polymers for Structural Applications, \$186,075, 3 years, 9/1/2012-8/31/2015.

Past Research Projects

53. F. A. Kamke and J. A. Nairn, “Structural wood-based composite from modified wood,” United States Department of Agriculture, \$450,000, 3 years, 9/15/2006-9/14/2009.
52. J. A. Nairn, “Gift funding to support computer modeling by post doc Liping Xu,” Advanced Dynamics, \$43,320, 1 year, 1/1/08-12/31/08.
51. J. A. Nairn and B. Lachenbruch, “Experiments and Modelling into the Material Properties and Mechanisms Controlling Internal Checking,” WQI, New Zealand, \$49,970, 1.5 years, 8/1/2007-12/31/2008.
50. University of Utah, “Center for Simulation of Accidental Fires and Explosions (C-SAFE),” Department of Energy, Advanced Scientific Computing Initiative (ASCI), \$46,000,000, 10 years, 9/1/97-9/31/2007 (I am one of about 20 Key Investigators on this project).
49. J. A. Nairn and G. S. Smith, “Multiscale Modeling and Experimental Study of the Mechanics of Polymer Nanocomposite Materials,” Department of Energy, \$1,065,000, 3 years, 9/15/2002-3/15/2006.
48. J. A. Nairn, “EMALS Stator Resin Development,” Closed Mold Composites, \$2,990, 3 months, 11/15/2004-2/15/2005.
47. J. A. Nairn, “The Development of Novel Electrochemical Surface Treatment for Carbon Fibers,” University of Utah — Incentive Seed Grant, \$23,900, 1 year, 1/1/2004-12/31/2004.
46. J. A. Nairn, “Advancing the Techniques of Thermoelastic Fracture Mechanics of Composite Materials,” National Science Foundation, \$169,735, 3 years, 9/1/97-8/31/2000.
45. J. A. Nairn, “Microcracking and Hygrothermal Aging of Composite Materials for High-Speed Civil Transports,” McDonnell Douglas, \$88,000, 3 years, 4/1/95-9/30/99.
44. H. D. Wagner, J. A. Nairn, and L. S. Schadler, “New Methods for the Interpretation of the Micromechanical Toughness of Interfaces in Composite Materials - Phase II,” Binational Science Foundation or Israel, \$139,575, 3 years, 9/1/96-8/31/99.
43. J. A. Nairn, “The Essential Work of Fracture for Resins Used in Blow-Molded Plastic Bottles,” duPont Company, \$40,000, 2 years, 11/1/95 to 10/31/97.
42. J. A. Nairn, “Micromechanics Analyses of Single-Fiber Experiments Can Give a Better Understanding of the Fiber/Matrix Interface in Composite Materials,” National Science Foundation, \$179,786, 3 years, 9/1/94-8/31/97.
41. J. A. Nairn, “1998 Gordon Research Conference on Composite Materials,” National Science Foundation, \$7,500, 6 months, 12/1/97-5/31/98.

40. J. A. Nairn, "Lubrication Effectiveness of Model Ophthalmic Solutions," Polymer Technology, \$4900, 6 months, 10/1/96-3/31/97.
39. J. A. Nairn, "Lubrication Effectiveness of Commercial and Developmental Ophthalmic Solutions," Bausch & Lomb Company, \$1500, 6 months, 10/1/96-3/31/97.
38. H. D. Wagner and J. A. Nairn, "New Methods for the Interpretation of the Micromechanical Toughness of Interfaces in Composite Materials," Binational Science Foundation of Israel, \$131,189, 3 years, 9/1/93-8/31/96.
37. J. A. Nairn, "Lubrication Effectiveness of Model Ophthalmic Solutions," Polymer Technology, \$4900, 6 months, 10/1/95-3/31/96.
36. J. A. Nairn, "Friction and Lubricity Properties of Some Experimental Contact Lenses," Pilkington, Barnes, Hind, \$5,000, 6 months 6/1/95 to 11/30/95.
35. J. A. Nairn, "Microcracking Study for McDonnell Douglas Aerospace-East," McDonnell Douglas, \$18,000, 1 year, 5/15/94-4/31/95.
34. J. A. Nairn, "Lubricity of Ocular Biomaterials," Bausch & Lomb, Inc., \$22,550, 1 year, 1/1/94-12/31/94.
33. J. A. Nairn, "Effect of Aging of Avimid[®] K-Polymer Composites and on other Composites Based on New duPont Resins," E. I. duPont de Nemours & Co., Textile Fibers Department, \$15,000, 1 year, 1/1/94-12/31/94.
32. J. A. Nairn, "Lubricity of Ocular Biomaterials," Bausch & Lomb, Inc., \$22,550, 1 year, 1/1/93-12/31/93.
31. J. A. Nairn, "High-Temperature Anti-Oxidative Stabilization of Advanced Composites," University of Utah Research Committee, \$5,000, 1 year, 3/1/93-2/28/94.
30. J. A. Nairn, "Effect of Aging of Avimid[®] K-Polymer Composites and on other Composites Based on New duPont Resins," E. I. duPont de Nemours & Co., Textile Fibers Department, \$30,000, 1 year, 11/15/92-12/31/93.
29. J. A. Nairn, "Mechanical Characterization of Resins for Bottle Applications," E. I. duPont de Nemours & Co., Polymer Products Department, \$20,000, 1 year, 6/1/92-5/31/93.
28. J. A. Nairn, "Fracture Analysis of Avimid[®] K-Polymer Composites and other Composites Based on New duPont Resins," E. I. duPont de Nemours & Co., Textile Fibers Department, \$25,000, 1 year, 1/1/92-12/31/92.
27. J. A. Nairn, "Turning the Microdrop Debond Into a Quantitative Measure of Interfacial Fracture Toughness," Center for Advanced Materials and the State of Utah, \$5,770, 1 year, 1/1/92-12/31/92.
26. W. D. Bascom and J. A. Nairn, "Measurement of the Frictional Resistance Between the Barrel and Plunger in Plastic Syringes," Becton Dickinson & Co., \$23,950, 1 year, 11/1/91-10/31/92.
25. W. D. Bascom and J. A. Nairn, "Lubricity of Ocular Biomaterials," Bausch & Lomb, Inc., \$23,750, 1 year, 10/1/91-12/31/92.

24. J. A. Nairn, "Cracking of Brittle Paints Applied to Polymer and Metallic Substrates," E. I. duPont de Nemours & Co., Finishes and Fabricated Products Department, \$14,000, 1 year, 8/1/91-10/31/92.
23. J. A. Nairn, "New Impact Tests and New Designs for Safe Bicycle Helmets," Sub-award to Biomedical Research Support Grant (BRSG), \$4,000, 1 year, 5/21/91-3/31/92.
22. J. A. Nairn, "Fracture Analysis of Avimid[®] K-Polymer Composites and other Composites Based on New duPont Resins," E. I. duPont de Nemours & Co., Textile Fibers Department, \$20,000, 1 year, 1/1/91-12/31/91.
21. J. A. Nairn, "New Designs and New Tests for Bicycle Helmets," Center for Advanced Materials and the State of Utah, \$1,500, 1 year, 10/1/89-9/30/91.
20. J. A. Nairn, "Cracking of Brittle Paints Applied to Polymer Substrates," E. I. duPont de Nemours & Co., Finishes and Fabricated Products Department, \$12,000, 1 year, 8/1/90-7/31/91.
19. J. A. Nairn, "Microcracking in Composite Materials," ICI Advanced Materials, \$50,370, 1 year, 6/1/90-5/31/91.
18. J. A. Nairn, "An Environmental Chamber for Measuring Temperature Dependent Properties of Composite Materials," Center for Advanced Materials and the State of Utah, \$8,790, 1 year, 5/1/90-4/30/91.
17. J. A. Nairn, "Fracture Analysis of Avimid[®] K-Polymer Composites," E. I. duPont de Nemours & Co., Textile Fibers Department, \$20,000, 1 year, 1/1/90-12/31/90.
16. J. A. Nairn, "Cracking of Brittle Paints Applied to Polymer Substrates," E. I. duPont de Nemours & Co., Finishes and Fabricated Products Department, \$11,000, 1 year, 7/1/89-6/30/90.
15. J. A. Nairn, "Cracking of Brittle Paints Applied to Polymer Substrates," Center for Advanced Materials and the State of Utah, \$5,500, 1 year, 7/1/89-6/30/90.
14. W. D. Bascom (Principal Investigator), S. Swanson, and J. A. Nairn, "The Role of Interphase Properties in the Compressive Failure of Carbon Fiber/Polymer Matrix Composites," Office of Naval Research, \$272,412, 3 years, 3/15/89-3/14/92.
13. J. A. Nairn, "Fracture of K Polymer Composites," E. I. duPont de Nemours & Co., Textile Fibers Department, \$20,000, 1 year, 1/1/89-12/31/89.
12. J. A. Nairn, "A Computer-Controlled Thermal Cycling Chamber," University of Utah Research Support Committee, \$9,500, Equipment grant, December 1988.
11. J. A. Nairn, "Characterizing the Fracture Toughness of Advanced Composite Structures," NASA Langley, \$177,711, 3 years, 12/9/88-8/15/92.
10. W. D. Bascom (Original Principal Investigator), S. Swanson, J. A. Nairn (Final Principal Investigator), and Hercules, Inc., "Effect of Matrix and Interphase on Carbon Fiber Composite Compression Strength," NASA, \$841,533, 5 years, 4/15/89-9/15/92.

9. J. A. Nairn, "Investigation of the Embrittlement of Ductile Polymers by Brittle Coatings such as Paint Layers," E. I. duPont de Nemours & Co., Finishes and Fabricated Products Department, \$8,139, 1 year, 10/1/88-9/30/89.
8. J. A. Nairn, "Fracture Mechanics Analysis of Composite Microcracking," University of Utah Research Committee, \$3,900, 1 year, 4/1/88-3/31/89.
7. J. A. Nairn, "Impact Testing of Composite Tubes," Quality Composites Inc., \$600, 6 months, 4/1/88-10/31/88.
6. J. A. Nairn, "Fracture of K Polymer Composites," E. I. duPont de Nemours & Co., Textile Fibers Department, \$15,000, 1 year, 1/1/88-12/31/88.
5. J. A. Nairn, "Essential Work of Fracture of Toughened Nylons," E. I. duPont de Nemours & Co., Polymer Products Department, \$10,000, 1 year, 1/1/88-12/31/88.
4. J. A. Nairn, "Essential Work of Fracture in Polymers," American Chemical Society, Petroleum Research Fund, \$18,000, 2 years, 7/15/87-2/1/90.
3. J. A. Nairn, "Fracture Mechanics of Composites," University of Utah Research Committee, \$5,000, 1 year, 4/1/87-3/31/88.
2. J. A. Nairn, "Fracture Toughness of Ductile Polymers," E. I. duPont de Nemours & Co., Polymer Products Department, \$35,000, 1 year, 1/1/87-12/31/87.
1. J. A. Nairn, "Failure of K Polymer Composites," E. I. duPont de Nemours & Co., Textile Fibers Department, \$15,000, 1 year, 1/1/87-12/31/87.

Invited Talks and Keynote Lectures

24. "Insights into Multimaterial Contact Mechanics in MPM Derived from Simulations of Compaction of Wood Strand Mats," Keynote Talk at the World Conference on Computational Mechanics, Sydney Australia, 19-23, 2010.
23. "Fracture Modeling of Crack Propagation in Wood and Wood Composites Including Crack Tip Processes and Fiber Bridging Mechanics," Invited Talk at the 12th International Congress on Fracture, Ottawa, Canada, 13-17 July 2009.
22. "Numerical Modeling of a Smart, Hierarchical, Adaptive, Self-Healing, Multifunctional, Bio-Nanocomposite Material," Invited Talk at Gordon Research Conference on Composites, Ventura, California, Jan 16, 2008.
21. "Numerical Modeling of the Deformation and Fracture of Wood Including Heterogeneity and Anisotropy," Keynote Lecture and COST Action E35 Meeting on Wood Mechanics and Machining, Lausanne, Switzerland, May 22, 2007.
20. "Numerical Modeling in Wood and Wood Composites," Invited talk at University of Washington, Seattle, WA, Jan 22, 2007.
19. "On the Calculation of Energy Release Rates for Cracked Laminates with Residual Stresses," Invited talk at Gordon Research on Composites, Ventura, California Jan 17, 2006.

18. "If One Must Do Shear Lag Analysis of Composites, How Should it be Done and What can it Do?," Invited talk at ECCM-11, Rhodes, Greece June 3, 2004.
17. "Modeling the Physico-Mechanical Behaviour of Composites," Marie Curie Training Event presented at ECCM-11, Rhodes, Greece June 1, 2004.
16. "Can Computer Simulations of Polymer Fracture be Instructive?," Invited talk at Prospects in Fracture, Imperial College, London, UK July 8-9, 2003.
15. "Finite Fracture Mechanics as a Method for Predicting Fracture Events in Composites," Invited talk at Workshop on Damage and Durability of Composites, US Air Force Academy, Colorado Springs, November 13-14, 2000.
14. "Fracture Mechanics of Composites with Residual Stresses, Imperfect Interfaces, and Traction-Loaded Cracks," Invited talk at Recent Advances in Continuum Damage Mechanics for Composites, LMT-Cachan, France, September 20, 2000.
13. "Finite Fractures Mechanics Analysis of Fracture Events in Composite Materials," Invited talk at Gordon Research Conference on Composites, Ventura, CA, January 9-13, 2000.
12. "Mechanical Modeling and Internal Stress Calculations in Filled Polymers," Keynote Lecture at Euro-Fillers '99, Lyon, France, September 6-8, 1999.
11. "Applications of Finite Fracture Mechanics for Predicting Fracture Events in Composites," Keynote Lecture at 5th Int'l Conf. on Def. and Fract. of Comp. Mat., London, England, March 17-18, 1999.
10. "Analytical Fracture Mechanics of the Microbond Test Including the Effects of Friction and Thermal Stresses," Invited Talk at TMS 1998 Fall Meeting, Chicago, Illinois, October 11-15, 1998.
9. "Fracture Mechanics of Composites with Residual Thermal Stresses," Keynote Lecture at 25th Midwestern Mechanics Conference, Rapid City, South Dakota, September 21, 1997.
8. "Stress Analysis of the Fragmentation Test Including the Effect of an Imperfect Interface: The Use of Energy Methods for Interpreting Experimental Results", Invited talk to International Conference on Composite Interfaces VI, Zichron Yaacov, Israel, May 8, 1996," .
7. "Variational Fracture Mechanics of Matrix Microcracking: Theory and Application to Hydrothermal Aging of Composites," Invited talk at Gordon Research Conference on Composites, Ventura, CA, January 10, 1996.
6. "Variational Fracture Mechanics of Matrix Microcracking," Invited talk at the Institute of Materials Annual Residence Conference, Richmond, England, November 29, 1995.
5. "Micromechanics of Damage Analysis of Transverse Ply Cracking (Microcracking)," Invited talk at the ICI Composites Research and Technology Workshop, Tempe, AZ, January 22, 1992.
4. "Micromechanics of Damage Analysis of Transverse Ply Cracking (Microcracking)," Invited talk at the Gordon Research Conference on Composites, Ventura, CA, January 16, 1992.
3. "Strain Energy Release Rate of Composite Microcracking," Invited talk at the Twelfth Asilomar Conference on Polymeric Materials, Pacific Grove, CA, February 14, 1989.

2. "Strain Energy Release Rate of Composite Microcracking," Invited talk at the Gordon Research Conference on Composites, Santa Barbara, CA, January 11, 1989.
1. "Thermoplastics as Matrix Resins for Advanced Composites: Matrix Solidification and the Resulting Residual Thermal Stresses in Composites," Invited talk at the Gordon Research Conference on Composites, Santa Barbara, CA, January 16, 1984.

Other Presentations

124. "Better Living Through Fracture Mechanics," INSA, Lyon, France, Nov. 4, 2011.
123. "Experiments and Modeling for Orthogonal Cutting of Polymers, Wood-Polymer Composites, and Solid Wood," 6th European Structural Integrity Society TC4 Conference, Les Diablerets, Switzerland, Sept. 11-15, 2011.
122. "Better Living Through Fracture Mechanics," École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, July 4, 2011.
121. "Better Living Through Fracture Mechanics," WSE Department, Oregon State University, Corvallis, OR, March 30, 2011.
120. "Numerical Modeling in Wood and Wood Composites using the Material Point Method," FP Innovations, Vancouver, Canada, Sep. 30, 2010.
119. "Numerical modeling and experiments on the role of strand-to-strand interface quality on the properties of oriented strand board," Wood Science & Engineering Winter Seminar Series, Corvallis, OR, Feb. 3, 2010.
118. "Numerical modeling and experiments on the role of strand-to-strand interface quality on the properties of oriented strand board," International Conference on Wood Adhesives, Lake Tahoe, CA, Sept. 28-30, 2009.
117. "MPM Simulation of Fracture Including Both Crack Tip Fracture Mechanics and Fiber Bridging Traction Laws - Application to Fracture of Composites and Medium Density Fiber Board (MDF)," 5th MPM Workshop, Corvallis, OR, April 2-3, 2009.
116. "The Fracture Toughness of Medium Density Fiber Board (MDF) Accounting for Fiber Bridging and Crack-Plane Interference Effects," 5th European Structural Integrity Society TC4 Conference, Les Diablerets, Switzerland, Sept. 9 2008.
115. "Measuring the Fracture Toughness of Medium Density Fiber Board (MDF) and other Composite Materials," Wood Based Composites Meeting, Corvallis, OR, May 15, 2008.
114. "Measuring the Fracture Toughness of Medium Density Fiber Board (MDF) and other Composite Materials," MSE Seminar, Oregon Sate University, Corvallis, OR, May 8, 2008.
113. "Numerical Modeling of Wood and Wood Composites Including Anisotropy, Heterogeneity, and Realistic Structures The M*A*S*H Concept," WSE Seminar, Oregon Sate University, Corvallis, OR, Apr. 23, 2008.
112. "Numerical Modeling of Wood or Other Anisotropic, Heterogeneous, and Irregular Materials," 4th Annual MPM Workshop, Salt Lake City, UT, Mar. 17, 2008.

111. "Fracture Toughness of MDF and Other Materials with Fiber Bridging," American Society of Composites, 22nd Annual Meeting, Seattle, WA, Sept. 18, 2007.
110. "Numerical Implementation of Imperfect Interfaces," Third Material Point Method Workshop, Sandia National Lab, Sandia, NM, Mar 23, 2007.
109. "Fracture Toughness of MDF and Other Wood Composites," Oregon State University, Corvallis, OR, Feb. 19, 2007.
108. "Numerical Simulation of Transverse Fracture in Wood," World Conference on Timber Engineering, Portland, OR, Aug. 7, 2006.
107. "Material Point Method Simulations of Solid Wood with Realistic Morphologies," World Conference on Computational Mechanics, Los Angeles, CA, July 18, 2006 and July 19, 2006 (given twice).
106. "Numerical Simulations of Transverse Compression and Fracture in Wood," Wood-Based Composites Meeting, Virginia Tech, Blacksburg, VA, Mar. 22, 2006.
105. "On the Calculation of Energy Release Rates for Cracked Laminates with Residual Stresses," Mechanical Engineering, Oregon State University, Corvallis, OR, Mar. 9, 2006.
104. "Analysis of Thermal Effects During Crack Propagation in Polymers (Some Numerical Modeling)," European Structural Integrity Society, Les Diablerets, Switzerland, Sept. 13, 2005.
103. "Numerical Simulations of Transverse Compression and Fracture in Wood," BOKU, Vienna, Austria, July 22, 2005.
102. "Numerical Simulations of Transverse Compression and Densification and of RT and TR Fracture in Wood," COST Action E35 Meeting on Wood Fracture and Machining, Stockholm, Sweden, June 13, 2005.
101. "Numerical Modeling of Fracture and Damage in Optical Glass using the Material Point Method," Lawrence Livermore National Laboratory, Livermore, CA, May 4, 2005.
100. "Material Point Method Calculations With Explicit Cracks, Fracture Parameters, And Crack Propagation," Material Point Method Workshop, University of Utah, Salt Lake City, UT, Mar. 15, 2005.
99. "Application of Numerical Modeling, Mechanics Analysis, and Fracture Methods to Problems in Wood, Wood Structures, and Wood-Based Composites," Oregon State University, Corvallis, OR, Mar. 30, 2005.
98. "Fracture Mechanics Methods in Failure and Damage Analysis of 'Composites'," Korean Institute of Metals and Machinery (KIMM), Chungju, Korea, November 11, 2004.
97. "Cracks, Crack Propagation, and Simulations of Fracture in the Material Point Method," Seoul National University (SNU), Seoul, Korea, November 10, 2004.
96. "If One Must Do Shear Lag Analysis of Composites, How Should it be Done and What can it Do?," Advanced Defense Department (ADD), Daejeon, Korea, November 10, 2004.
95. "Hygrothermal Aging of Polyimide Matrix Composite Laminates," Advanced Defense Department (ADD), Daejeon, Korea, November 9, 2004.

94. "Cracks, Crack Propagation, and Simulations of Fracture in the Material Point Method," Advanced Defense Department (ADD), Daejeon, Korea, November 9, 2004.
93. "Cracks, Crack Propagation, and Simulations of Fracture in the Material Point Method," Korean Advanced Institute of Science and Technology (KAIST), Deajeon, Korea, November 8, 2004.
92. "Fracture Mechanics Methods in Failure and Damage Analysis of 'Composites'," Advanced Defense Department (ADD), Daejeon, Korea, November 8, 2004.
91. "Cracks, Crack Propagation, and Simulations of Fracture in the Material Point Method," ATK Thiokol, Brigham City, UT, October 4, 2004.
90. "Fracture Mechanics Methods in Failure and Damage Analysis of 'Composites'," Oregon State University, Corvallis, OR, September 30, 2004.
89. "Cracks, Crack Propagation, and Simulations of Fracture in the Material Point Method," Los Alamos and Sandia National Labs, New Mexico, April 20, 2004 (web version at <http://www.eng.utah.edu/~nairn/Talks/MPMFracture/>).
88. "Finite Fracture Mechanics of Cracking of Coatings," National Physical Laboratory (NPL), Teddington, United Kingdom, July 11, 2003.
87. "Material Point Method with Explicit Cracks and Crack Propagation," Los Alamos and Sandia National Labs, New Mexico, March 12-13, 2003.
86. "Simulation of Crack Growth in Ductile Materials," École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, July 5, 2002.
85. "A Description of the Material Point Method for Numerical Analysis of Dynamic Problems," Ecole Normale Supérieur de Cachan, France, June 19, 2002.
84. "Fracture Mechanics Analysis of the Single-Fiber Pull-Out Test and the Microbond Test Including The Effects of Friction and Thermal Stresses," 16th Ann. Mtg. of the Amer. Soc. Composites, Blacksburg, VA, Sept 9-12, 2001.
83. "Exact and Variational Theorems for Fracture Mechanics of Composites with Residual Stress, Traction Loaded Cracks, and Imperfect Interfaces," Fracture of Polymers, Composites, and Adhesives, Les Diablerets, Switzerland, September 13-15, 1999.
82. "Fracture Mechanics Analysis of Fiber Breakage and Interfacial Debonding in the Fragmentation Test and the Microbond Test," Interfacial Phenomena in Composite Materials 1999, Berlin, Germany, September 7-10, 1999.
81. "Applications of Finite Fracture Mechanics for Predicting Fracture Events in Composites," École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, August 11, 1999.
80. "Applications of Finite Fracture Mechanics for Predicting Fracture Events in Composites," University of Patras, Patras, Greece, July 28, 1999.
79. "Hygrothermal Aging of Polyimide Matrix Composite Laminates, International Conference on Composite Materials (ICCM 12), Paris, France, July 5-9, 1999," .

78. "Exact and Variational Theorems for Fracture Mechanics of Composites with Residual Stresses, Traction-Loaded Cracks, and Imperfect Interfaces," University of Utah Math Department, Salt Lake City, Utah, November 9, 1998.
77. "Hygrothermal Aging of Polyimide Matrix Laminates, NASA/Boeing Workshop, Seattle, Washington, September 16, 1998," .
76. "On the Use of Energy Methods for Studying Interfacial Fracture in Composite Materials," NIST, Gaithersburg, Maryland, June 1, 1998.
75. "Fracture Mechanics of Composites with Residual Thermal Stresses," University of Utah, Mechanical Engineering Department, Salt Lake City, Utah, May 15, 1998.
74. "Fracture Mechanics of Composites with Residual Thermal Stresses," University of Utah, Material Science Department, Salt Lake City, Utah, February 4, 1998.
73. "Analytical Fracture Mechanics of the Microbond test Including the Effect of Friction and Thermal Stresses," 25th Midwestern Mechanics Conference, Rapid City, South Dakota, September 21, 1997.
72. "Fracture Mechanics of Composites with Residual Thermal Stresses: Examples Including Variational Mechanics of Composite Microcracking," Joint ASME, ASCE, and SES Summer Meeting, Evanston, Illinois, July 2, 1997.
71. "Fracture Mechanics of Composites with Residual Thermal Stresses," Workshop on Linkage Between Non-Destructive Testing and Damage Mechanics of Composite Materials, Lincoln, Nebraska, December 7, 1996.
70. "The Effect of Hygrothermal Aging on the Microcracking Properties of HSR Materials," High-Speed Research (HSR) Workshop, NASA Langley, Virginia, September 18, 1996.
69. "The Effect of Hygrothermal Aging on the Microcracking Properties of Avimid[®] K3B/IM7 Laminates," McDonnell Douglas Aerospace Corporation, St. Louis, MO, December 14, 1995.
68. "Stress Transfer Across an Imperfect Interface into a Fragmented Anisotropic Fiber," University of Sheffield, Sheffield, England, November 27, 1995.
67. "Stress Transfer Across an Imperfect Interface into a Fragmented Anisotropic Fiber," Interfacial Phenomena in Composite Materials, Eindhoven, Netherlands, September 11, 1995.
66. "Some New Variational Mechanics Results on Composite Microcracking," ICCM 10, Vancouver, BC, Canada, August 16, 1995.
65. "Measurement of the Friction and Lubricity Properties of Contact Lenses," ANTEC '95, Boston, MA, May 8, 1995.
64. "Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface," University of Utah, Material Science Department, Salt Lake City, Utah, December 7, 1994.
63. "Friction and Lubricity Properties of Polymers," Becton Dickenson, Salt Lake City, Utah, December 1, 1994.

62. "Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to Raman Data and the Single Fiber Fragmentation Test," ASTM Meeting, Phoenix, Arizona, November 14, 1994.
61. "Bounds and Effectively Exact Solution for Both the Modulus and Energy Release Rate of a Cracked Laminate," University of Utah, Applied Math Symposium, Salt Lake City, Utah, October 18, 1994.
60. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," ICI Ltd., Wilton Laboratory, Middlesbrough, England, June 28, 1994.
59. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," Shell Research, Arnhem, The Netherlands, June 14, 1994.
58. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," Weizmann Institute, Rehovot, Israel, May 26, 1994.
57. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," Imperial College, London, England, May 11, 1994.
56. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, May 5, 1994.
55. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," Office National d'Etudes et de Recherches Aérospatiales, Chatillon, France, May 3, 1994.
54. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," Office National d'Etudes et de Recherches Aérospatiales, Chatillon, France, May 3, 1994.
53. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," École Central, Paris, France, May 2, 1994.
52. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," Imperial College, London, England, April 27, 1994.
51. "A Variational Mechanics Analysis of Microcracking in Composite Laminates," University of Surrey, Surrey, England, April 26, 1994.
50. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," University of Manchester Institute of Science and Technology, Manchester, England, April 21, 1994.
49. "Bessel Function Analysis of Stress Transfer from the Matrix to the Fiber Through an Imperfect Interface: Application to the Fragmentation Test," University of London, Queen Mary and Westfield College, London, England, March 24, 1994.
48. "Variational Methods in the Analysis of Composite Fracture: Application to Matrix Microcracking and Single-Fiber Fragmentation Tests," Exxon, Clinton, NJ, June 25, 1993.

47. "Essential Work of Fracture of Bottle Resins," duPont Co., Experimental Station, Wilmington, DE, June 22, 1993.
46. "Studies on Friction and Lubricity of Contact Lens Materials," Bausch & Lomb, Rochester, New York, September 17, 1992.
45. "A Variational Mechanics Analysis of Stresses and Failure in Embedded Single-Fiber Tests Specimens," Microphenomena in Advanced Composites, Herzlia, Israel, June 28, 1992.
44. "Fracture Mechanics Analysis of Cracking in Automotive Paints," duPont Co., Marshall Laboratory, Philadelphia, PA, June 17, 1992.
43. "A New Analysis of Matrix Microcracking in Composite Laminates: A Variational Approach," General Electric Aircraft Engines, Cincinnati, OH, June 16, 1992.
42. "Master Plot Analysis of Microcracking in Graphite/Epoxy and Graphite/PEEK Laminates," Third NASA Advanced Composites Technology Conference, Long Beach, CA, June 10, 1992.
41. "Micromechanics of Damage Analysis of Transverse Ply Cracking (Microcracking)," University of Utah, Salt Lake City, UT, February 5, 1992.
40. "Variational Mechanics Analysis of Stresses and Fracture in Cross-Ply Laminates," Applied Mathematics Colloquium, University of Utah, Salt Lake City, UT, November 19, 1991.
39. "On the Thermally-Induced Residual Stresses in Thick Fiber-Thermoplastic Matrix (PEEK) Cross-Ply Laminated Plates," Ninth NASA/DOD/FAA Conference on Fibrous Composites Structural Designs, Lake Tahoe, Nevada, November 7, 1991.
38. "Variational Analysis of the Stresses in Microdrop Debond Specimens," Eighth International Conference on Composite Materials, Honolulu, Hawaii, July 18, 1991.
37. "Fracture Mechanics Analysis of Paint Cracking, Delamination, and Surface Embrittlement," duPont Co., Marshall Laboratory, Philadelphia, PA, April 18, 1991.
36. "Fracture Mechanics Analysis of Microcracking and Microcrack Induced Delaminations," duPont Co., Chestnut Run Laboratory, Wilmington, DE, April 17, 1991.
35. "Fracture Mechanics Analysis of Microcracking and Microcrack Induced Delaminations," NASA Langley Research Center, Hampton, VA, April 15, 1991.
34. "A Variational Mechanics Analysis of the Stresses Around Breaks in Single-Fiber Composites," University of Utah, Salt Lake City, UT, January 16, 1991.
33. "The Initiation, Propagation, and Effect of Matrix Microcracks in Cross-Ply and Related Laminates," First NASA Advanced Composites Technology Conference, Seattle, WA, October 30, 1990.
32. "In situ Determination of the Toughness of Coatings on Polymeric Substrates and A New Look at Surface Embrittlement of Polymeric Materials," duPont Co., Marshall Laboratory, Philadelphia, PA, June 4, 1990.
31. "Fracture Mechanics Analysis of Composite Microcracking: Experimental Results," Fifth Annual Meeting of the American Society of Composites, East Lansing, MI, June 12, 1990.

30. "Fracture Mechanics Analysis of Composite Microcracking: Experimental Results," Dow Chemical Co., Midland, MI, June 11, 1990.
29. "Fracture and Impact Studies of Thermoplastic Resins," SAMPE Utah Chapter Meeting, Salt Lake City, UT, May 17, 1990.
28. "Fracture Mechanics Analysis of Composite Microcracking: Experimental Results," University of Utah, Salt Lake City, UT, April 25, 1990.
27. "Characterizing the Fracture Toughness of Advanced Composite Structures," NASA Langley Research Center, Advanced Composite Technology Workshop, Hampton, VA, May 18, 1989.
26. "The Measurement of Polymer Viscoelastic Response During an Impact Experiment," duPont Co., Experimental Station, Wilmington, DE, April 17, 1989.
25. "Fracture Mechanics Analysis of Cracking in Paints," duPont Co., Marshall Laboratory, Philadelphia, PA, October 26, 1988.
24. "The Initiation of Microcracking in Cross-Ply Laminates: A Variational Mechanics Analysis," Third Annual Meeting of the American Society of Composites, Seattle, WA, September 28, 1988.
23. "The Essential Work of Fracture of Toughened Nylon," American Chemical Society, Los Angeles, CA, September 27, 1988.
22. "Fracture Mechanics of Multiple Cracking in Paint Films," duPont Co., Experimental Station, Wilmington, DE, June 29, 1988.
21. "Characterizing the Fracture Toughness of Advanced Composites," SAMPE Utah Chapter Meeting, Salt Lake City, UT, February 25, 1988.
20. "Composite Microcracking: A Variational Approach," University of Utah, Salt Lake City, UT, January 22, 1988.
19. "The Essential Work of Fracture of Polymers," duPont Co., Experimental Station, Wilmington, DE, December 18, 1987.
18. "Fracture Mechanics of Unidirectional Composites," Second Technical Conference of the American Society of Composites, Newark, DE, September 23, 1987.
17. "Fracture Mechanics of Unidirectional Composites," Society of Engineering Science Meeting, Salt Lake City, UT, September 22, 1987.
16. "Fracture Mechanics of Unidirectional Composites Containing an Elliptical Hole," Sixth International Conference on Composite Materials, London, England, July 21, 1987.
15. "Fracture Mechanics of Unidirectional Composites," US Army Materials Laboratory, Watertown, MA, June 23, 1987.
14. "Fracture Mechanics of Unidirectional Composites," NASA Langley Research Center, Hampton, VA, March 16, 1987.
13. "Fracture Mechanics of Unidirectional Composites," duPont Co., Experimental Station, Wilmington, DE, December 19, 1986.

12. "Fracture Mechanics of Unidirectional Composites Using the Shear-Lag Model," Massachusetts Institute of Technology, Boston, MA, October 19, 1986.
11. "Fracture Mechanics of Unidirectional Composites Using the Shear-Lag Model," University of Colorado, Boulder, CO, September 24, 1986.
10. "Residual Thermal Stresses and Failure in Thermoplastic Matrix Composites," University of Utah, Salt Lake City, UT, May 27, 1986.
9. "The Essential Work of Fracture of Polymers," Texas A&M University, College Station, TX, April 3, 1986.
8. "Fracture and Fatigue of Thermoplastic Matrix Composites," Texas A&M University, College Station, TX, October 31, 1985.
7. "Flexural Fatigue of Uniaxial Glass-Reinforced Amorphous Thermoplastics," American Chemical Society, Chicago, IL, September 11, 1985.
6. "Residual Thermal Stresses in Semicrystalline Thermoplastic Matrix Composites," Fifth International Conference on Composite Materials, San Diego, CA, August 1, 1985.
5. "Magnitude and Effect of Residual Thermal Stresses in Thermoplastic Matrix Composites," Rutgers University, New Brunswick, NJ, June 11, 1985.
4. "Transverse Fracture of Polysulfone/Graphite Composites," CCMS Annual Review Program, Virginia Polytechnic Institute and State University, Blacksburg, VA, April 24, 1985.
3. "Residual Thermal Stresses in Amorphous and Semicrystalline Thermoplastic Composites," ASTM Symposium on Toughened Composites, Houston, TX, March 14, 1985.
2. "Residual Thermal Stresses and Fatigue in Semicrystalline Thermoplastic Matrix Composites," University of Massachusetts, Amherst, MA, January 23, 1985.
1. "Residual Thermal Stresses and Their Effects in High Performance Composites," Composites: Materials and Engineering Symposium, University of Delaware, Newark, DE, September 26, 1984.