

JOHN C. ALDRIN

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Education

Northwestern University, Evanston, IL 60208

Theoretical and Applied Mechanics, Doctor of Philosophy, June 2001

Dissertation: Models and Classification Procedures for Ultrasonic Inspection of Holes for Fatigue Cracks (Prof. J. D. Achenbach - Major Professor)

Purdue University, West Lafayette, IN 47907

Mechanical Engineering, Master of Science, May 1996

Thesis: Investigation of Vibration Control Systems Applied to an Automatic Washer Suspension Design (Prof. W. Soedel - Major Professor)

Purdue University, West Lafayette, IN 47907

Mechanical Engineering, Bachelor of Science, May 1994, With Distinction

Undergraduate Research Project: Dynamic Analysis of an Historical Ballistic Mechanism

Graduate Level Coursework - *Mechanics:*

Mechanical Vibration, Advanced Dynamics, Fundamentals of Fluid Dynamics, Engineering Acoustics, Advanced Engineering Acoustics, Theory of Elasticity II (Contact Mechanics), Vibration of Continuous Systems, Wave Propagation in Elastic Solids.

Graduate Level Coursework - *Mathematical Modeling, Computational Methods and Optimization:*

Complex Analysis, Differential Equations in Mathematical Physics (2,3), Nonlinear Engineering, Asymptotic and Perturbation Methods (1,2), Numerical Methods in Mechanical Engineering, Finite and Boundary Element Methods, Optimal Design.

Graduate Level Coursework - *Nondestructive Testing, Data Analysis and Control:*

Nondestructive Testing, Theory and Design of Control Systems, Microprocessors in Electromechanical Systems, Statistics, Advanced Digital Signal Processing.

Work

Computational Tools, Gurnee, IL 60031

Experience

Engineering Consultant, February 2001 to present

(see Contracts Awarded below)

- Lead AFOSR task to develop strategy and conduct research for computational methods in nondestructive evaluation (NDE) in support of the direction of AFRL/MLLP.
- Performed research on mathematical modeling in NDE (UT, EC).
- Developed software platform to enable research studies and streamline the development of automated signal classification systems for NDE.
- Support SAIC Ultra Image Int. to develop automated ultrasonic inspections for C-141 rib clip holes, C-130 beam cap holes, C-130 hat section holes, and C-130 rainbow fitting holes through modeling, feature extraction, signal classification and flexible user interface development.
- Developed strategy, software for component life management integrating NDE with AES Inc.

Northwestern University, Center for Quality Engineering, Evanston, IL 60208

Graduate Research Assistant, January 1998 – February 2001

- Developed a simulation of the scattering of an ultrasonic transducer signal by a C-141 weep hole (cylindrical cavity) with a surface breaking crack using the boundary element method.
- Developed algorithm using neural networks to detect bottom and top cracks in weep holes.
- Designed and implemented PC software (operator interface in VB, analysis in DVF) that interfaces with the Ultra Image IV system for automated ultrasonic inspection of weep holes.
- Developed models and ultrasonic inspection procedures for special holes cases: fluid filled cavity, cavity with elastic insert and stiffness interface, cavity with elastic coating.

**Work
Experience
(cont.)**

Whirlpool Corporation, Benton Harbor, MI 49022

Project Engineer, May 1996 - December 1997

St. Joseph Technical Center - Advanced Laundry Development, May 1997 - December 1997

- Successfully led Catalyst wash system sub-team through Concept Selection Milestone.
- Corporate Technology Development - Fabric Care Advanced Development, May 1996-April 1997
- Developed and implemented novel automatic washer spin dynamics test platform.
- Performed fundamental experimental studies on automatic washer suspension performance.
- Developed strategy and performed investigations for the application of sensors to washers.

Purdue University, Herrick Laboratories, West Lafayette, IN 47907

Graduate Research Assistant, January 1995 - May 1996

- Performed review of the state-of-the-art in vibration control systems.
- Developed analysis methodology and performed assessment of the most promising vibration control systems for application to automatic washer suspension design.
- Performed analytical investigations of adaptive passive automatic washer suspension concepts.

Whirlpool Corporation, Benton Harbor, MI 49022

Engineer, May 1994 - December 1994

Corporate Technology Development - Fabric Care Advanced Development

- Assessed performance of washer suspension using dynamic models developed with ADAMS.
- Performed designed experiments on prototype automatic washer suspension.
- Performed modal analysis for prototype automatic washer tub structure.

Whirlpool Corporation, Benton Harbor, MI 49022

Engineering Co-op Intern, May 1990 - April 1993

- Experimentally analyzed dynamic forces of an automatic washer suspension structure.
- Performed extensive work in modal analysis and operational deflection shapes of structures.
- Conducted sound quality survey of automatic washers.
- Evaluated CFC recovery processes for refrigerator systems.
- Performed experimental investigations of energy use, air flow and temperature in dryers.
- Designed software program which processed spectrophotometer data.

**Training
and Skills**

- *Teaching experience:* Substitute lecturer for course on nondestructive evaluation (2000), Mentor for undergraduate research project summer intern (1998).
- *Software experience:* ABAQUS, ANSYS, ADAMS, FEAP, OPERA 3D, VIC 3D, Imagine3D, CIVA (UT), Matlab, Maple, Minitab, R, LabVIEW, Origin, MS Office, MS Access, MS Project.
- *Program languages:* Visual Basic (V6, .NET), C++, C#, Fortran, and Assembly
- *Laboratory skills:* Buildup of mechanical and electrical aspects of prototypes, Setup of data acquisition and control systems.
- *Technical seminars:* NDT of Composites, Active Vibration Control, Sensors, Introduction into Taguchi Techniques, Design of Experiments for Discovery, Improvement and Robustness, Elementary ADAMS.
- *Management seminars:* Precision Management, Working in Teams.
- *Foreign languages:* Introductory language training in Italian, French and German.

Publications

1. Aldrin, J. C. Steffes, G., and Knopp, J. S., "Simulation and Automated Data Classification for Eddy Current Inspection of Fastener Sites Using a GMR Sensor Array with Sheet Current Excitation," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
2. Aldrin, J. C., Knopp, J. S., Lindgren, E. A., Jata, K. V., "Model-assisted Probability of Detection (MAPOD) Evaluation for Eddy Current Inspection of Fastener Sites," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
3. Aldrin, J. C., Knopp, J. S., Lindgren, E. A., Jata, K. V., "Model-based Inversion in Eddy Current Image Processing", *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
4. Aldrin, J. C., Jata, K. V., Lindgren, E. A., Chellapilla, S. S., Medina, E. A., "Analytical Model of the Scattering of Guided Waves from Fastener Sites with a Stiffness Interface," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
5. Aldrin, J. C., Williams, P. A., Wincheski, B., "Models in the Design and Validation of Eddy Current Inspection for Cracking in the Shuttle Reaction Control System Thruster," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
6. Roth D. J., Tokars, R. P., Martin, R. E., Rauser, R. W., Aldrin, J. C., "Ultrasonic phased array simulations of welded components at NASA," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
7. Murphy, R. K., Sabbagh, H. A., Sabbagh, E. H., Blodgett, M. P., Knopp, J., Aldrin, J. C., "Model development for broadband spiral-coil eddy-current probes," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
8. Sabbagh, E. H., Sabbagh, H. A., Murphy, R. K., Sheila-Vadde, A., Blodgett, M. P., Knopp, J., Aldrin, J. C., "Modeling anisotropic grain noise in eddy-current NDE: reliability assessment of inverse problems," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
9. Sabbagh, H. A., Aldrin, J. C., Murphy, R. K., Sabbagh, "Application of model-based inversion to eddy-current NDE of heat-exchanger tubing," *Review of Progress in QNDE*, Vol. 28, AIP, (to be published, 2009).
10. Knopp, J. S., Aldrin, J. C., Sabbagh, H. A., and Jata, K. V., "Estimation Theory Metrics in Electromagnetic NDE", *Electromagnetic Nondestructive Evaluation Workshop Proceedings*, Seoul, Korea, June 10-12, 2008.
11. Aldrin, J. C. and Knopp, J. S., "Modeling and Simulation for Nondestructive Testing with Applications to Aerospace Structures", *Materials Evaluation*, Vol. 66, n 1, p. 53-59, (2008).
12. Knopp, J. S., Aldrin, J. C., and Jata, K.V., "Computational Methods in Eddy Current Crack Detection at Fastener Sites in Multi-Layer Structures," *Nondestructive Testing and Evaluation*, Vol. 24, n 1-2, March 2009, pp. 103-120.
13. Sabbagh, H. A., Murphy, R. K., Sabbagh, E. H., Aldrin, J. C., "Application Of Model-based Inversion to Eddy-Current NDE of Heat-Exchanger Tubing", *Materials Evaluation*, Vol. 66, n 7, pp. 764-774 (2008).
14. Medina, E. A. and Aldrin, J. C., "Value Assessment Approaches for Structural Life Management through SHM", *Encyclopedia of Structural Health Monitoring*, John Wiley & Sons, Ltd. (accepted for publication, 2008).
15. Sabbagh, H. A., Murphy, R. K., Sabbagh, E. H., Aldrin, J. C., Knopp, J. S., "The Joy of Computing with Volume-Integrals", *The 24th Annual Review of Progress in Applied Computational Electromagnetics*, Niagara Falls, Ontario, Canada, (2008).
16. Chellapilla, S. S., Aldrin, J. C., Jata, K. V., "Interaction of Guided Waves with Fastener Sites in Aircraft Structures", *Proceedings of the 6th International Workshop on Structural Health Monitoring*, pp. 910-918, (2007).
17. Knopp, J. S., and Aldrin, J. C., "Fundamental Feature Extraction Methods for the Analysis of Eddy Current Data," *Electromagnetic Nondestructive Evaluation (ENDE) Conference Proceedings*, Cardiff, Wales, June 19 – 21, 2007.
18. Aldrin, J. C., Medina, E. A., Allwine, D. A., Knopp, J. S., "Tradeoff Analysis Tools For Hybrid NDE-SHM Life Management Strategies" *Aging Aircraft Conference*, Palm Springs, CA, (2007).
19. Lindgren, E., Aldrin, J. C., Jata, K. Scholes, B., Knopp, J., "Ultrasonic Plate Waves for Fatigue Crack Detection in Multi-layered Metallic Structures", *Proc SPIE Int Soc Opt Eng*, Vol. 6532, (2007).
20. Aldrin, J. C., Knopp, J. S., Lindgren, E. A., Annis, C., Sabbagh, H. A., Sabbagh, E. H., Murphy, R. K., "Reliability Demonstration for an Eddy Current NDE Technique Using a Computational

- Electromagnetic Model-Assisted Approach", *The 23rd Annual Review of Progress in Applied Computational Electromagnetics*, Verona, Italy, (2007).
21. Murphy, R. K., Sabbagh, H. A., Sabbagh, E. H., Aldrin, J. C., Knopp, J. S., Lindgren, E. A., "Clutter Removal and Inversion of Eddy-Current Impedance Data", *The 23rd Annual Review of Progress in Applied Computational Electromagnetics*, Verona, Italy, (2007).
 22. Murphy, R. K., Sabbagh, H. A., Sabbagh, E. H., Aldrin, J. C., Lindgren, E. A., Knopp, J. S., "Modeling Pitting and Corrosion Phenomena by Eddy-Current Volume-Integral Equations", *The 23rd Annual Review of Progress in Applied Computational Electromagnetics*, Verona, Italy, (2007).
 23. Murphy, R. K., Sabbagh, H. A., Sabbagh, E. H., Aldrin, J. C., Knopp, J. S., "Application of a Volume-Integral Code to Gap + Insert Problems in Aerospace Nondestructive Evaluation", *The 23rd Annual Review of Progress in Applied Computational Electromagnetics*, Verona, Italy, (2007).
 24. Roth, D. J., Aldrin, J. C., Seebo, J. P., Trinh, L. B., Walker, J. L., Winfree, W. P., "Chapter 26: Recent Advanced Signal Processing Methods For Waveform-Based NDE Methods", *Ultrasonic and Advanced Methods for Nondestructive Testing and Material Characterization*, edited by C.H. Chen, World Scientific Publishing, (2007), pp. 613-632.
 25. Kramb, V.A., Lindgren, E.A., Aldrin, J.C., Kropas-Hughes, C.V., "Aerospace Applications of Ultrasonic Testing", *Nondestructive Testing Handbook, Third Edition: Volume 7, Ultrasonic Testing*, Workman, G. L. (tech. ed.), Kishoni, D. (tech. ed.), Moore, P. O. (ed.), American Society of Nondestructive Testing. Columbus, OH. (2007).
 26. Aldrin, J. C., Knopp, J. S., "Case Study for New Feature Extraction Algorithms, Automated Data Classification, and Model-Assisted Probability of Detection Evaluation", *Review of Progress in QNDE*, Vol. 26, AIP, pp 257-264, (2007).
 27. Knopp, J. S., Aldrin, J. C., Lindgren, E. A., Annis, C. "Investigation of a Model-Assisted Approach to Probability of Detection Evaluation", *Review of Progress in QNDE*, Vol. 26, AIP, pp. 1775-1782, (2007).
 28. Aldrin, J. C., Medina, E. A., Allwine, D. A., QadeerAhmed, M., Fisher, J., Knopp, J. S., Lindgren, E. A., "Probabilistic Risk Assessment: Impact of Human Factors on Nondestructive Evaluation (NDE) and Sensor Degradation on Structural Health Monitoring (SHM)", *Review of Progress in QNDE*, Vol. 26, AIP, pp. 1461-1468, (2007).
 29. Lindgren, E. A., Knopp, J. S., Aldrin, J. C., Steffes, G. J., Buynak, C. F. "Aging Aircraft NDE: Capabilities, Challenges, And Opportunities", *Review of Progress in QNDE*, Vol. 26, AIP, pp. 1731-1738, (2007).
 30. Aldrin, J. C., Roth, D. J., Seebo, J. P., Winfree, W. P., "Protocol and Assessment of Signal Processing and Feature Extraction Methods for Terahertz NDE For Spray-on Foam Insulation", *Review of Progress in QNDE*, Vol. 26, AIP, pp. 432-439, (2007).
 31. Roth, D. J., Seebo, J. P., Trinh, L. B., Walker, J. L., Aldrin, J. C., "Protocol and Assessment of Signal Processing and Feature Extraction Methods for Terahertz NDE For Spray-on Foam Insulation", *Review of Progress in QNDE*, Vol. 26, AIP, pp. 415-424, (2007).
 32. Aldrin, J. C., Knopp, J. S., "Crack Characterization Method with Invariance to Noise Features for Eddy Current Inspection of Fastener Sites", *Journal of Nondestructive Evaluation*, Vol. 25, n 4, pp. 165-181, (2006).
 33. Knopp, J. S., Aldrin, J. C., Misra, P., "Considerations in the Validation and Application of Models for Eddy Current Inspection of Cracks Around Fastener Holes", *Journal of Nondestructive Evaluation*, Vol. 25, n 3, pp. 123-138, (2006).
 34. Aldrin, J. C., Knopp, J. S., Lindgren, E. A., Annis, C. "Model-Assisted Approach to Probability of Detection Evaluation for Structural Applications", *ASNT Fall Conference 2006 Proceedings*, Houston, TX, October 2006, pp. 248-252.
 35. Aldrin, J. C., Medina, E. A., Jata, K. V., Knopp, J. S., "Simulation-Based Design of a Guided-Wave Structural Health Monitoring System for a Plate-Stiffener Configuration", *Proceedings of the 3rd European Workshop on Structural Health Monitoring*, pp. 1078-1085, (2006).
 36. Medina, E. A., Aldrin, J. C., Knopp, J. S., Allwine, D. A., "Value Assessment Tools for Hybrid NDE-SHM Life Management Strategies", *Proceedings of the 3rd European Workshop on Structural Health Monitoring*, pp. 1027-1034, (2006).

37. Jata, K. V., Knopp, J. S., Aldrin, J. C., Medina, E. A., Lindgren, E. A., "Transitioning from NDE Inspection to Online Structural Health Monitoring – Issues and Challenges", *Proceedings of the 3rd European Workshop on Structural Health Monitoring*, pp. 987-995, (2006).
38. Aldrin, J. C., Kropas-Hughes, C. V., Knopp, J., Mandeville, J. R., Judd, D., Lindgren, E., "Advanced Echo-Dynamic Measures for the Characterisation of Multiple Ultrasonic Signals in Aircraft Structures", *Insight*, Vol. 48, n 3, pp. 144-148, (2006).
39. Aldrin, J. C., Sabbagh, H. A., Sabbagh, E. H., Murphy, R. K., Lindgren, E., Knopp, J., "Strategies for Improving Inverse Methods for Eddy Current NDE Corrosion Characterization", *The 22nd Annual Review of Progress in Applied Computational Electromagnetics*, Miami, FL, (2006).
40. Aldrin, J. C., Knopp, J. S., "Method for Crack Characterization with Noise Invariance for Eddy Current Inspection Of Fastener Sites", *Review of Progress in QNDE*, Vol. 25, AIP, pp. 315-322, (2006).
41. Knopp, J. S., Sabbagh, H.A., Aldrin, J. C., Murphy, R. K., Sabbagh, E. H., Hoffmann, J., "Efficient Solution of Electromagnetic Scattering Problems Using Spatial Decomposition Algorithms", *Review of Progress in QNDE*, Vol. 25, AIP, pp. 299-306, (2006).
42. Aldrin, J. C., Knopp, J. S., Judd, D., Mandeville, J. R., Lindgren, E., "Spiral Creeping Waves in Ultrasonic Angled-Beam Shear Wave Inspection of Fastener Holes In Multilayer Structures", *Review of Progress in QNDE*, Vol. 25, AIP, pp. 187-194, (2006).
43. Aldrin, J. C., Medina, E. A., Knopp, J. S., "Cost Benefit Analysis Incorporating Probabilistic Risk Assessment For Structural Health Monitoring", *Review of Progress in QNDE*, Vol. 25, AIP, pp. 1910-1918, (2006).
44. Aldrin, J. C., Sabbagh, H. A., Sabbagh, E. H., Murphy, R. K., Concordia, M., Judd, D., Lindgren, E., Knopp, J. S., "Methodology Using Inverse Methods for Pit Characterization in Multilayer Structures", *Review of Progress in QNDE*, Vol. 25, AIP, pp. 767-774, (2006).
45. Aldrin, J. C., Medina, E. A., Altynova, M., Kropas-Hughes, C. V., Knopp, J. S., "Strategy and Software Framework for the Integration of QNDE and Product Life Management Design", *Review of Progress in QNDE*, Vol. 24, pp. 1682-1689, (2005).
46. Knopp, J. S., Aldrin, J. C., "Numerical Studies of Eddy Current NDE for Small Crack Detection around Fasteners in Multi-Layer Structures", *Review of Progress in QNDE*, Vol. 24, AIP, pp. 417-424, (2005).
47. Aldrin, J. C., Kropas-Hughes, C. V., Knopp, J., Mandeville, J. R., Judd, D., Lindgren, E., "Advanced Echo-Dynamic Measures for the Characterization of Multiple Ultrasonic Signals in Aircraft Structures", *16th World Conference on Nondestructive Testing*, Montreal, Canada, (2004).
48. Knopp, J. S., Aldrin, J. C., Sabbagh, H., Ko, R. T., "Modeling Eddy Current Crack Detection in Multi-Layer Airframe Structures Using the Volume-Integral Method", *ACES Conference*, Syracuse, NY, (2004).
49. Lindgren, E., Judd, D., Concordia, M., Mandeville, J., Aldrin, J. C., Spencer, F., Fritz, D., Pratt, E., Waldbusser, R., Mullis, R. T., "Validation and Deployment of Automated Ultrasonic Inspections for the C-130 Center Wing," *ASIP Conference*, Savannah, Georgia, (December 2 - 4 2004).
50. Knopp, J. S., Aldrin, J. C., Sabbagh, H., Ko, R. T., "Numerical and Experimental Study of Eddy Current Crack Detection around Fasteners in Multi-Layer Structures", *Review of Progress in QNDE*, Vol. 23, AIP, pp. 336-343, (2004).
51. Aldrin, J. C., Mandeville, J. R., Kropas-Hughes, C. V., "Ultrasonic Detection of Cracks in a Complex Aircraft Structure Using a Local Correlation Method for Signals from a Moving Transducer", *Review of Progress in QNDE*, Vol. 23, AIP, pp. 565-572, (2004).
52. Aldrin, J. C., Knopp, J. S., Blackshire, J. L., Sathish, S., "Models and Methodology for the Characterization of Surface-Breaking Cracks Using an Ultrasonic Near-Field Scattering Measurement", *Review of Progress in QNDE*, Vol. 23, AIP, pp. 87-94, (2004).
53. Aldrin, J.C., "Computational Methods in Nondestructive Evaluation - Research Strategy and Multidimensional Signal Processing Methods for Feature Classification," *Final Report, AFRL-ML-WP-TR-2004-4146*, Air Force Research Laboratory, August 2003.
54. Song, W.-J., Popovics, J. S., Aldrin J. C., Shah, S. P., "Measurement of surface wave transmission coefficient across surface-breaking cracks and notches in concrete," *Journ. Acoust Soc. America*, (2003).

55. Aldrin, J., Achenbach, J. D., "Models for Crack Detection in a Cylindrical Hole Containing an Elastic Layer and a Fluid-Filled Cylindrical Hole," *Review of Progress in QNDE*, Vol. 22, p. 181, (2003).
56. Aldrin, J. C., Mandeville, J. R., Judd, D. R., Mullis, R. T., Kropas-Hughes C. V., "Crack Detection for Aircraft Holes with Limited Accessibility Containing Fasteners and Sealant," *Review of Progress in QNDE*, Vol. 22, (2003), p. 173.
57. Eric Lindgren, David Judd, John Mandeville, Tim MacInnis, Michael Concordia, Bartolo Drennen, Robert Grills, John Aldrin, Edward Pratt, Raymond Waldbusser, R. Tommy Mullis, "Enhanced Nondestructive Evaluation Techniques for the C-130 Center Wing," *Aging Aircraft Conference* (2002).
58. Aldrin, J., Achenbach, J. D., "Model and Methodology for Crack Detection on a Cylindrical Hole Containing an Elastic Insert," *Review of Progress in QNDE*, Vol. 21, p. 181, (2002).
59. Aldrin, J., "Overview of Mathematical Modeling in Nondestructive Evaluation (NDE)," *Nondestructive Testing Information Analysis Center, NT-SP-01-03*, (2002).
60. Aldrin, J., Achenbach, J. D., Andrew, G., P'an, C., Grills, B., Mullis, R. T., Spencer, F. W., Golis, M., "Case Study for the Implementation of an Automated Ultrasonic Technique to Detect Fatigue Cracks in Aircraft Weep Holes," *Materials Evaluation*, Vol. 59, n 11, p.1313, (2001).
61. Aldrin, J., Achenbach, J. D., "Refined Detection of Cracks in Weep Holes Using Spatial Signal Variation," *Review of Progress in QNDE*, Vol. 20, (2001).
62. Aldrin J., Cheng, A., Achenbach, J. D., Andrew, G., Mullis, R.T., "Detection of Cracks in Weep Holes Using Neural Networks," *Review of Progress in QNDE*, Vol. 19, p. 1979, (2000).
63. Aldrin, J., Conrad, D. and Soedel, W., "Investigation of Passive and Adaptive Passive Dynamic Absorbers Applied to an Automatic Washer Suspension Design," *Proc SPIE Int Soc Opt Eng*, Vol. 2720, (1996).

Patents

1. Whah, K. N., Euler, J. W., Pinkowski, R. J., Aldrin, J. C., "Control for an Automatic Washer with Spray Pretreatment," *US Patent # 6,269,666*, August 7, 2001.
2. Whah, K. N., Euler, J. W., Pinkowski, R. J., Aldrin, J. C., "Control for an Automatic Washer with Spray Pretreatment," *US Patent # 6,393,872*, May 28, 2002.
3. Whah, K. N., Euler, J. W., Pinkowski, R. J., Aldrin, J. C., "Control for an Automatic Washer with Spray Pretreatment," *US Patent # 6,584,811*, July 1, 2003.
4. Whah, K. N., Euler, J. W., Pinkowski, R. J., Aldrin, J. C., "Control for an Automatic Washer with Spray Pretreatment," *US Patent # 6,591,439*, July 15, 2003.

Presentations

1. "Sensitivity Analysis for Characterizing Pits Using Eddy Current Techniques with Inverse Methods," *ASNT Fall Conference 2008*, Charleston, SC, November 2008.
2. "Progress on Model-assisted POD (MAPOD) Demonstration Projects for the Air Force," *ASNT Fall Conference 2008*, Charleston, SC, November 2008.
3. "Case Simulation and Automated Data Classification for Eddy Current Inspection of Fastener Sites Using a GMR Sensor Array with Sheet Current Excitation", *Review of Progress in QNDE*, Chicago, IL, July 2008.
4. "Model-assisted Probability of Detection (MAPOD) Evaluation for Eddy Current Inspection of Fastener Sites", *Review of Progress in QNDE*, Chicago, IL, July 2008.
5. "Models in the Design and Validation of Eddy Current Inspection for Cracking in the Shuttle Reaction Control System Thruster", *Review of Progress in QNDE*, Chicago, IL, July 2008.
6. "Model-based Inversion in Eddy Current Image Processing", *Review of Progress in QNDE*, Chicago, IL, July 2008.
7. "Analytical Model of the Scattering of Guided Waves from Fastener Sites with a Stiffness Interface", *Review of Progress in QNDE*, Chicago, IL, July 2008.
8. "Application of Models and Data Analysis Methods to Improve Eddy Current Inspection for Cracks at Fastener Holes with Gaps and Adjacent Fastener Sites," *ASNT Fall Conference 2007*, Las Vegas, NV, November 2007.
9. "Automated Ultrasonic Inspection of Fastener Sites in Multilayer Structures for Fatigue Cracks with Variable Angular Location," *ASNT Fall Conference 2007*, Las Vegas, NV, November 2007.
10. "Tradeoff Analysis Tools For Hybrid NDE-SHM Life Management Strategies" *Aging Aircraft Conference*, Palm Springs, CA, April, 2007.

11. "Applications of the Volume Integral Code to Gap + Insert Problems in Aerospace Nondestructive Evaluation," *ACES 2007*, Verona, Italy, March 2007.
12. "Reliability Demonstration for an Eddy Current NDE Technique Using a Computational Electromagnetic Model-Assisted Approach," *ACES 2007*, Verona, Italy, March 2007.
13. "Model-Assisted Approach to Probability of Detection Evaluation for Structural Applications", *ASNT Fall Conference 2006*, Houston, TX, October 2006.
14. "Computational Methods in Nondestructive Evaluation (NDE) with Applications to Automated Design and Reliability Validation", Invited Lecture on Reliability, Whirlpool Corporation, Benton Harbor, MI, October 2006.
15. "Probabilistic Risk Assessment: Impact of Human Factors on Nondestructive Evaluation (NDE) and Sensor Degradation on Structural Health Monitoring (SHM)", *Review of Progress in QNDE*, Portland, OR, August 2006.
16. "Protocol and Assessment of Signal Processing and Feature Extraction Methods for Terahertz NDE For Spray-on Foam Insulation", *Review of Progress in QNDE*, Portland, OR, August 2006.
17. "Case Study for New Feature Extraction Algorithms, Automated Data Classification, and Model-Assisted Probability of Detection Evaluation", *Review of Progress in QNDE*, Portland, OR, August 2006.
18. "Simulation-Based Design of a Guided-Wave Structural Health Monitoring System for a Plate-Stiffener Configuration", *3rd European Workshop on Structural Health Monitoring*, Granada, Spain, July 2006.
19. "Quantitative NDE and SHM Approaches for Sizing Fatigue Cracks in Aircraft Structures Using Computational Methods," *AeroMat 2006*, Seattle, WA, May 2006.
20. "Strategies for Improving Inverse Methods for Eddy Current NDE Corrosion Characterization," *ACES 2006*, Miami, FL, March 2006.
21. "Exploring Quantitative NDE and SHM Approaches for Sizing Fatigue Cracks in Aircraft Structures using Computational Methods", Seminar to NDE Branch, Materials Directorate, Air Force Research Laboratory, Wright Patterson AFB, November 2005.
22. "Method for Crack Characterization with Noise Invariance for Eddy Current Inspection Of Fastener Sites", *Review of Progress in QNDE*, Brunswick, Maine, August 2005.
23. "Spiral Creeping Waves in Ultrasonic Angled-Beam Shear Wave Inspection of Fastener Holes In Multilayer Structures", *Review of Progress in QNDE*, Brunswick, Maine, August 2005.
24. "Cost Benefit Analysis Incorporating Probabilistic Risk Assessment For Structural Health Monitoring", *Review of Progress in QNDE*, Brunswick, Maine, August 2005.
25. "Methodology Using Inverse Methods for Pit Characterization in Multilayer Structures", *Review of Progress in QNDE*, Brunswick, Maine, August 2005.
26. "Overview of Model-based POD Studies", Model-Assisted POD Working Group meeting, Palm Springs, CA, February 2005.
27. "Model-based Signal Enhancement of Ultrasonic and Eddy Current Data", *ASNT 2004 Fall Conference*, Las Vegas, NV, November 2004.
28. "Advanced Echo-Dynamic Measures for the Characterization of Multiple Ultrasonic Signals in Aircraft Structures", *16th World Conference on Nondestructive Testing*, Montreal, Canada, August 2004.
29. "Strategy and Software Framework for the Integration of QNDE and Product Life Management Design", *Review of Progress in QNDE*, Golden, Colorado, July 2004.
30. "Automated Signal Classification (ASC) in NDE and POD Evaluation", *Workshop on Probability of Detection (POD) Evaluation*, University of Dayton Research Institute, Dayton, Ohio, March 2004.
31. "Enhanced Nondestructive Evaluation Technique for Crack Detection of C-130 Beam Cap Holes", *Aging Aircraft Conference*, New Orleans, Louisiana, September 2003.
32. "Ultrasonic Detection of Cracks in a Complex Aircraft Structure Using a Local Correlation Method for Signals from a Moving Transducer", *Review of Progress in QNDE*, Green Bay, Wisconsin, July 2003
33. "Models and Methodology for the Characterization of Surface-Breaking Cracks Using an Ultrasonic Near-Field Scattering Measurement", *Review of Progress in QNDE*, Green Bay, Wisconsin, July 2003.

34. "Models for Crack Detection in a Cylindrical Hole Containing an Elastic Layer and a Fluid-Filled Cylindrical Hole", *Review of Progress in QNDE*, Bellingham, WA, July 2002.
35. "Crack Detection for Aircraft Holes with Limited Accessibility Containing Fasteners and Sealant," *Review of Progress in QNDE*, Bellingham, WA, July 2002.
36. "The Role of Optimization in Addressing NDE Challenges," *AeroMat 2002*, Orlando, FL, June, 2002.
37. "Automated Signal Classification Development Environment for Nondestructive Evaluation," *ASNT Spring Conference*, Portland, OR, March, 2002.
38. "Model and Methodology for Crack Detection on a Cylindrical Hole Containing an Elastic Insert," *Review of Progress in QNDE*, Brunswick, ME, August, 2001.
39. "Refined Detection of Cracks in Weep Holes Using Spatial Signal Variation," *Review of Progress in QNDE*, Ames, IA, July, 2000.
40. "Detection of Cracks in Weep Holes Using Neural Networks," *3rd Joint DOD/FAA/NASA Conference on Aging Aircraft*, Albuquerque, NM, September, 1999.
41. "Detection of Cracks in Weep Holes Using Neural Networks," *Review of Progress in QNDE*, Montréal, Québec, Canada, July, 1999.
42. "Use of the Boundary Element Method for Modeling the Detection of Cracks in Weep Holes," *Mechanics Club – Northwestern University*, Evanston, IL, June, 1999.
43. "Investigation of Passive and Adaptive Passive Dynamic Absorbers Applied to an Automatic Washer Suspension Design," *Smart Structures and Materials: Passive Damping and Isolation*, SPIE, San Diego, CA, March, 1996.

**Contracts
Awarded**

- "Computational Methods for Nondestructive Evaluation (NDE)", visiting scientist, lead on AFOSR task, NDE branch of the Material and Manufacturing Directorate of the Air Force Research Laboratory, subcontract with Universal Technology Corporation, (2001-2003, 2003-2009).
- "Advanced NDE Technologies Application Development", NDE branch of the Material and Manufacturing Directorate of the Air Force Research Laboratory, subcontract with Universal Technology Corporation, (2006-2008, 2008-2009).
- "C-130 Inspection Techniques", Science Applications International Corporation, (2001-2002) [address C-130 hat section and rainbow fitting inspections]
- "C-130 Rip Clip Inspection Technique Incorporating Automated Defect Analysis", Science Applications International Corporation, (2003-2004)
- "C-130 Beam Cap Hole Inspection Technique Incorporating Automated Defect Analysis", Science Applications International Corporation, (2003-2004)
- "Corrosion Topology", Science Applications International Corporation, (2003-2005)
- "F-111 Inspection Techniques", Science Applications International Corporation, (2004)
- "Feasibility of Using Ultrasonic Techniques to Inspect T-37B Wing Structure ", Science Applications International Corporation, (2004-2005)
- Subcontractor on "Virtual NDE" SBIR Phase I Grant, Austral Engineering & Software, Inc., (2002)
- Subcontractor on "Virtual NDE" SBIR Phase II Grant, Austral Engineering & Software, Inc., (2003-2006)
- Subcontractor on "Data Fusion of Eddy Current, Ultrasonic, and Radiographic Data," SBIR Phase I Grant, TRI/Austin, Inc., AF06-079, (2006)
- Subcontractor on "Modeling of Nondestructive Evaluation (NDE) Processes for Reliability Assessment," SBIR Phase I Grant, Victor Technologies LLC, AF081-033, (2008)
- Subcontractor on "Modeling of Nondestructive Evaluation (NDE) Processes for Reliability Assessment," SBIR Phase I Grant, TRI/Austin, Inc., AF081-033, (2008)
- NASA NDE Super Problem Resolution Team (SPRT), NDE for spary-on-foam insulation, subcontract with Swales Aerospace, (2004-2006)
- NASA NDE SPRT, Computational NDE, subcontract with Swales Aerospace [now ATK], (2007-2009)

**Awards and
Activities**

- 2006 Young NDT Professional Award (ASNT).
- 2002 Outstanding Paper Award, *Materials Evaluation* (ASNT).

- President - Mechanics Club - Northwestern University (1999-2000 academic year).
- Conference Session Chair - ACES 2009 Conference – Monterrey, California
- Conference Session Chair - ASNT 2008 Fall Conference – Charleston, SC
- Conference Session Chair - ACES 2008 Conference – Niagara Falls, Ontario, Canada
- Conference Session Chair - ASNT 2007 Fall Conference – Las Vegas, Nevada
- Conference Session Chair - AeroMat 2006 Conference – Seattle, Washington
- Conference Session Chair - ASNT 2005 Fall Conference – Columbus, Ohio
- Conference Session Chair - QNDE 2005 Conference – Brunswick, Maine
- Conference Session Chair - ASNT 2004 Fall Conference – Las Vegas, Nevada
- Conference Session Chair - WCNDT 2004 - Montreal, Canada
- Conference Session Aide - ICTAM 2000 - Chicago, Illinois
- Reviewer: Materials Evaluation, Ultrasonics, Journal of Nondestructive Evaluation, Research in Nondestructive Evaluation, NDT & E Int, Nondestructive Testing and Evaluation, Applied Computational Electromagnetics Society (ACES)
- Volunteer Docent - Oriental Institute Museum - University of Chicago (2003 to date)

Affiliations

- Member - The American Society of Nondestructive Testing (ASNT)
- Member - The American Society of Mechanical Engineers (ASME)
- Member - The Institute of Electrical and Electronics Engineers (IEEE)
- Member – Applied Computational Electromagnetics Society (ACES)

References provided upon request.