

## GEORGE A. LESIEUTRE

### Technical Expertise

Structural dynamics of aerospace systems. Passive vibration damping, active structures, piezo actuation, energy harvesting, composite mat'ls.

### Education

Ph.D., Aerospace Engineering, UCLA, 1989. M.S. 1986.  
B.S., Aeronautics and Astronautics, MIT, 1981.

### Honors and Professional Activities

2010 Director At-Large, AIAA Board of Directors  
2009 Fellow, American Institute of Aeronautics and Astronautics (AIAA)  
2009 UCEA Mid-Atlantic Program & Activities Award (Wind Energy)  
2008 ASME Best Paper (Adaptive Structures)  
2008 AIAA Sustained Service Award  
2007 Hirschorn IAC Best Paper Prize (Inst. of Noise Control Eng'g.)  
2006 CIC (Big 10) Department Executive Officers Program Fellow  
2001 AIAA Zarem Educator Award  
2000 ASME Best Paper (AIAA Structures, Structural Dynamics and Materials Conference)  
2000 Penn State Engineering Society (PSES) Outstanding Research Award  
1999 American Society of Mechanical Engineers (ASME) Best Paper (Adaptive Structures)  
1995 American Helicopter Society (AHS) Best Paper (AHS Forum, Dynamics)  
Deputy Director, Structures: AIAA Technical Activities Committee (TAC), 2004-2009  
AIAA Technical Activities Committee liaison to Honors and Awards Committee, 2006-2010  
AIAA Adaptive Structures Technical Committee, 1997- ; Chair, 2000-2002  
AIAA Structural Dynamics Technical Committee, 1990-1996  
National Merit Scholarship, 1977 • General Motors Scholarship, 1979-1981 • Tau Beta Pi, 1981



### Experience

The Pennsylvania State University, Department of Aerospace Engineering, 1989-present  
SPARTA, Inc., Aerospace Technology, La Jolla and Laguna Hills, CA, 1983-1989  
Rockwell International (Boeing), Satellite Systems Division, Seal Beach, CA, 1981-1983  
General Motors, Allison Gas Turbines Division, Indianapolis, IN, summers 1979-1980  
Argonne Nat'l Laboratory, Energy and Environmental Systems, Argonne, IL, summers 1977-8  
LaSalle: Expedition II, Montreal to New Orleans, 1976-1977

**Penn State: Professor and Head, Aerospace Engineering, Director of the Center for Acoustics and Vibration.** Teach and research in aerospace structural dynamics. Oversee undergraduate and graduate instructional and research programs in aerospace engineering. Develop personnel and facilities. Develop strategic direction for the department and pursue support to make it happen.

**SPARTA: Director of Space Structures.** Developed, managed, and performed research programs involving composite materials and structures for space applications.

**Rockwell International: Stress and Dynamics Engineer.** Analysis and testing of spacecraft structures, including truss sizing optimization, composite stress analysis, fracture control, design of damping treatments and consideration of control-structure interaction.

**General Motors: GM Scholar.** Supported gas turbine engine project groups. Single-stage gasifier for T63/250. Foreign object ingestion of 501/D22F. Reduced emissions combustor.

**Argonne National Laboratory: Student Intern.** Modeled and optimized engineering and economic performance of solar heating energy storage systems.

**LaSalle: Expedition II: Voyageur.** Paddled birchbark canoe from Montreal to the Gulf of Mexico during 8-month reenactment of LaSalle's voyage, part of U.S. Bicentennial celebration.

### Personal

51 years old, married 29 years, 2 children. Advisor for two Philmont treks. Runner, sub-20 5K, 3:10 marathon (Boston '06-'10), 4<sup>th</sup> place (masters) USATF 50 Mile Championship ('09); bicyclist, 2 double centuries. Guitarist, singer. Instrument-rated private pilot. U.S. Citizen. SECRET clearance.

**GEORGE A. LESIEUTRE**  
Highlights of Academic CV

**Honors**

1 AIAA educator award, 1 AIAA service award, 5 society or conference best paper awards, 1 Penn State research award, 2 admin awards. Fellow, AIAA. Board of Directors, AIAA.

**Service and Leadership Positions in Penn State Aerospace Engineering Department**

Department Head since 2004. Director of Graduate Studies. Executive Committee. Committee Chair. Strategic Planning, Faculty Search, Promotion and Tenure, Laboratory Facilities and Safety (Space); Newsletter Editor.  
Member. Undergraduate Curriculum Committee, Ad Hoc Committee on Structures and Dynamics Curriculum, Ad Hoc Committee on Ph.D. English Proficiency.  
Advisor. Aerospace Graduate Students Association, Sigma Gamma Tau.

**Service and Leadership Positions in Penn State College of Engineering**

Director, Center for Acoustics and Vibration. Leader, Adaptive Structures interest group. Chair, Task Force on Research Centers. Chair, Task Force on the graduate program in Acoustics. Engineering Faculty Council. Secretary, Newsletter Editor, Graduate Studies Committee.

**Penn State University Service**

Applied Research Laboratory Advisory Board.  
Graduate Council. Research, Student Affairs Committees. Liaison to Engineering Faculty Council. University Faculty Senate. Computer Systems Committee, Outreach Committee.

**Service and Leadership in Professional Societies**

AIAA Board of Directors (At-Large).  
AIAA Technical Activities Committee.  
Deputy Director, Materials & Structures; Liaison to Honors and Awards Committee.  
Member. SDM Strategic Directions Comm., SDM Organizing Comm. Str. Dynamics TC  
Chair. Adaptive Structures TC. General & Technical Chair, Adaptive Structures Forum.  
Fellow, AIAA. Member, AHS, ASC, ASEE; Tau Beta Pi, Sigma Xi.

**Refereed Journal Articles**

More than 60 refereed journal articles, most co-authored with students, some with colleagues. SCI h-factor 16, more than 1000 citations. Scholarometer h-index 21, >1700 citations.

**Proceedings Papers / Conference Presentations.** More than 210.

**Patents.** 3 patents, 1 pending, all involving piezoelectric devices.

**Grants and Contracts**

More than 80, many with collaborators. Value of weighted share exceeds \$6,500,000 since 1990.

**Courses Taught**

Topics in structures, dynamics, and controls; 10 distinct undergraduate and 4 graduate courses.

**Theses Supervised or co-Supervised**

20 Ph.D. (17 complete) , 37 M.S. (35 complete), 10 B.S. Honors (10)). More than 60 additional thesis committees.

## **Honors**

2010 Elected to Board of Directors of American Institute of Aeronautics & Astronautics (AIAA)

2009 AIAA Fellow

2009 UCEA Mid-Atlantic Program & Activities Award (Wind Energy Symposium)

2008 ASME Best Paper (Adaptive Structures), (with M. Frecker and co-advisee V. Mehta)  
(American Society of Mechanical Engineers)

2008 AIAA Sustained Service Award

2007 Hirschorn IAC Best Paper Prize, Institute of Noise Control Engineering. (w/ advisee M. Yang and co-advisors S.A. Hambric and G.H. Koopmann)

2006 CIC (Big 10) Department Executive Officers Program Fellow

2001 AIAA Zarem Educator Award

2000 ASME Best Paper (AIAA Structures, Structural Dynamics and Materials Conference) (w/ D.J. Inman and co-advisee R. Rusovici)

2000 Penn State Engineering Society (PSES) Outstanding Research Award

1999 ASME Best Paper (Adaptive Structures) (w/ advisee C.L. Davis)

1995 American Helicopter Society (AHS) Best Paper (AHS Forum, Dynamics) (w/ E.C. Smith and co-advised students)

Several students won independent paper awards. (Brackbill, Hébert, Culler, Bernard, Loverich, Marr, Wissa)

## **Aerospace Engineering Department Service**

Department Head, 2004-present.

- Led major revision of aerospace engineering curriculum.

  - Increased emphasis on systems, software, hands-on projects, and active learning.

  - Established certificate in space systems engineering (for non-aerospace students)

  - Developed regular course offering plan.

- Led department through a successful ABET review.

- Led numerous successful faculty, staff and student award nominations.

- Worked with university to streamline procedures for export control (ITAR) and industry sponsorship (IP, publications issues).

- Led campus wind energy working group, resulting in several awards and new faculty.

- Invested in low-turbulence wind-tunnel, cluster computing, and rotor facilities, as well as undergraduate laboratories.

- Implemented a “6-S” laboratory organization and safety program.

- Established the “McCormick Fund” and “Wolk Thesis Award” with alumni support.

  - Attracted significant additional deferred gifts to the department.

- Helped secure renewal of Rotorcraft Center of Excellence research program.

- Facilitated increase of departmental research funding to over \$6M from under \$3M.

- Led administrative alignment of the Graduate Program in Acoustics with Aerospace Eng.

- Increased faculty size to 19 from 14, including 2 new positions, 3 in Acoustics (1 open).

Director of Graduate Studies, 1999-2004.  
Executive Committee, 1998-present.  
Strategic Planning Committee, 1989-90; 1992; 1995-; Chair, 1995-1997.  
Faculty Search Committee, 1994-1995; 1998-1999; Chair, 1994-5.  
Associate Professor Promotion and Tenure Committee, 1997-8, Chair.  
Promotion and Tenure Committee, 2001-, Chair, 2003.  
Laboratory Facilities and Safety (Space) Committee, 1989-1996; 1998-9; Chair, 1998-9.  
Undergraduate Curriculum Committee, 1990-1997.  
Newsletter. Editor. 1990-1996.  
Ad Hoc Committee on Structures and Dynamics Curriculum, 1989-2004.  
Ad Hoc Committee on Ph.D. English Proficiency, 1993-1994.  
Aerospace Graduate Students Association, Advisor, 1996-2004.  
Sigma Gamma Tau (Student Honorary Society), Advisor, 1994-2001.

### **College of Engineering Service**

Center for Acoustics and Vibration, 1990-.  
    Director, 2009-. Increased number of industrial members, internal participation.  
    Associate Director, 1993-2009. Leader, Adaptive Structures technical group, 1992-.  
Search Committee, Associate Dean for Administration, 2008.  
COE Task Force on New Graduate Programs, 2007-2008. Chair.  
COE Task Force on the Graduate Program in Acoustics, 2006-7. Chair.  
COE Task Force on Research Centers, 2005-2007. Chair.  
Search Committee, Department Head, Civil Engineering, 2005-2006.  
AD-14 Review Committee, Department Head, Industrial Engineering, 2005-2006.  
AD-14 Review Committee, Associate Dean for Administration, 2002-2003.  
Whitaker Award review committee, 2003-2005.  
Nominating Committee, 2002-2004.  
PSES Research Award Selection Committee, 2001-2003.  
Engineering Faculty Council, 1992-1995.  
    Secretary, College of Engineering Faculty, 1992-1993. Newsletter Editor, 1993-1994.  
    Graduate Studies Committee, 1993-1995.  
CQI Team on Graduate Student Recruiting. 1994-1995.  
Structures Coordination Team, 1994-1995. Controls Coordination Team, 1995.  
Composites Manufacturing Technology Center Space Committee, 1991-1993.

### **Penn State University Service**

Applied Research Laboratory Advisory Board (ARLAB), 2010-.

NSF Engineering Research Center (ERC) proposal planning team, 2008-2010.

Guest Lecturer, Higher Education 597A, Planning, Budgeting, & Strategic Management, 2006-.

Graduate Council, 2002-2004.

    Research Committee, 2002-2003.

    Graduate Student and Faculty Issues. 2003-2004.

    Liaison to Engineering Faculty Council. 2002-2004.

University Faculty Senate, Engineering Caucus, 1997-2001.

    Computer Systems Committee, 1997-1999.

    Outreach Committee, 1999-2001.

Leonhard Center Technical Writing Initiative, Guest Lecturer, English 202C, 1995-present.

Judge, Graduate Research Exhibition (3years); Judge, Undergraduate Research Exhibition, 2003.

Participated in numerous high school and other outreach programs.

### **Professional Activities and Service**

American Institute of Aeronautics and Astronautics (AIAA), 1979-. Fellow. Lifetime member.

American Helicopter Society (AHS). Member, 1993-.

American Society for Composites (ASC). Member, 1991-, not continuous.

American Society for Engineering Education (ASEE). Member, 2002-.

Tau Beta Pi, Lifetime Member, 1980-.      Sigma Xi, Member, 1989-.

AIAA Board of Directors, At-Large Director, 2009-.

    Deputy Director, Structures, AIAA Technical Activities Committee (TAC), 2004-2009.

    Liaison to AIAA Honors and Awards Committee (HAC), 2006-2010.

    Strategic Directions Committee, SDM Conference, 2002-2009.

    Adaptive Structures Technical Committee, 1997-present. Chair, 2000-2002. Vice-Chair, 1999; subcommittees: Conferences (Chair).

        General Chair, AIAA Adaptive Structures Forum, Atlanta, GA, April, 2000.

        Technical Chair, AIAA Adaptive Structures Forum, St. Louis, MO, April, 1999.

        Organizer and Presenter, AIAA Adaptive Structures Short Course, 2000-1.

        Organizing Committee (representing the Adaptive Structures Technical Committee), AIAA Adaptive Structures Forum, 1998-2000 (3 years).

    Structural Dynamics Technical Committee, 1990-1995.

        Organizing Committee (representing the Structural Dynamics Technical Committee), 36th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, New Orleans, April, 1995.

    Orange County Section Guidance, Control & Dynamics TC, Steering Committee, 1983-1989; Programs Chair, 1984.

    Judge, AIAA national student paper “Jefferson Goblet” competition, 1993.

Aerospace Department Chairs Association (ADCA)

Led effort to redefine subfields for the NRC decadal survey of doctoral programs.

Led investigation of visa issues for international graduate students in aerospace engineering.

International Conference on Adaptive Structures Technologies, Organizing Committee, 2001-  
Host and General Chair, 2010.

NSF CMMI Workshop on Multifunctional Materials And Distributed Renewable Energy For  
Sustainable Infrastructure, Honolulu. Organizer, June 2009.

ESF-NSF Workshop on the Applications of Adaptive Structures and Materials to Sustainable  
Energy and the Built Environment, Château de Pizay, Morgon, France. Organizer, October  
2008.

Engineering Foundation Conference on “Engineered Adaptive Structures.” Organizing  
Committee, 1997, 1999, 2001, 2003, 2006, 2008, 2011. Chair, 2001, 2011.

SPIE Smart Structures Conference. Organizing Committee, 1997-.

ASC. Organizing Committee Member, 1992 ASC Conference, Penn State, October, 1992.

SES. Organizing Committee Member, 2002 SES Conference, Penn State, October, 2002.

“Vertical Lift Research Center of Excellence program,” invited presentation to Board on Army  
Science And Technology (BAST), Washington, DC, May 11-12, 2010.

ESF-NSF Smart Structural Systems Technologies Workshop (S3T-2010), University of Porto,  
Portugal, Invited Participant, 6-9 April 2010.

U.S.-Italy Aerospace Business Networking Forum, Puglia Region, Invited U.S. academic  
delegate, February 28 - March 6, 2010.

Review Panel, ARPA-E Grid Storage and Non-Solar Renewable Energy, September 15, 2009.

U.S.-Europe Workshop on Adaptive Aerospace Structures and Materials, Couvent Royal, Saint-  
Maximin, France, Invited Participant, 4-7 November 2007.

AFOSR Future Flight Structures Workshop, Arlington, VA, Invited Participant, 15-16 October  
2007.

Lesieutre, G.A., “Piezoelectric Energy Harvesting for Vibration Control and Resource  
Conservation,” at the International Workshop on Electro-Active Materials and Sustainable  
Growth, Abbaye Les Vaux de Cernay, France, Invited Keynote, May 23-25, 2005.

Served as session chair at technical conferences more than 30 times.

Reviewed more than 140 papers for professional technical journals.

**Refereed Journal Articles and Book Chapters**

Lesieutre, G.A., “Frequency-Independent Modal Damping for Flexural Structures via a Viscous ‘Geometric’ Damping Model,” *J. Guidance, Control and Dynamics*. (accepted August 2010)

Lesieutre, G.A., “Damping in Structural Dynamics,” *Encyclopedia of Aerospace Engineering*, John Wiley & Sons, R. Blockley and W. Shyy, Editors, October, 2010.

Zhang, L., T. Simpson, M. Frecker, and G.A. Lesieutre, “Supporting Trade Space Exploration for Multi-dimensional Data with Interactive Multi-Scale Nested Clustering and Aggregation,” *Journal of Engineering Design*, 23 June 2010. DOI: 10.1080/09544828.2010.487260.

Koo, K.N., and G.A. Lesieutre, “Vibration and Critical Speeds of Composite-Ring Disks for Data Storage,” *Journal of Sound and Vibration*, Vol. 329, No. 7, 29 June 2010, pp. 833-847.

Lesieutre, G.A., “How Membrane Loads Influence the Modal Damping of Flexural Structures,” *AIAA Journal*, Vol. 47, No. 7, July 2009, pp. 1642-1646.

Mehta, V., M. Frecker, and G.A. Lesieutre, “Stress Relief in Contact-Aided Compliant Cellular Mechanisms,” *ASME Journal of Machine Design*, 18 August 2009, Vol. 131, No. 9, DOI: 10.1115/1.3165778. **(2008 Best Paper in Adaptive Structures, ASME)**

Bharti, S., M. Frecker, G.A. Lesieutre, “Optimal Design of a Morphing Wing Using Parallel Non-Dominated Sorting Genetic Algorithm II,” *AIAA Journal*, Vol. 47, No. 7, July 2009, pp. 1627-1634

Kauffman, J.L., and G.A. Lesieutre, “A Low-Order Model For The Design Of Piezoelectric Energy Harvesting Devices,” *Journal of Intelligent Material Systems and Structures*, Vol. 20, March, 2009, pp. 495-504.

Ramrakhiani, D., M. Frecker, and G.A. Lesieutre, “Hinged Beam Elements For The Topology Design Of Compliant Mechanisms Using The Ground Structure Approach,” *ASME J. Structural & Multidisciplinary Optimization*, Vol. 37, No. 6, February, 2009, pp. 557-567.

Ramachandran, S., and G. Lesieutre, “Dynamics and Performance of a Vertical Impact Damper,” *Journal of Vibration and Acoustics*, Vol. 130, No. 2, article number 021008, April, 2008.

Loverich, J.J., G.H. Koopmann, G.A. Lesieutre, “A New Piezoelectric Actuator using a Feed-Screw for Quasi-Static Motion Accumulation – Part II: Mathematical Modeling and Design Optimization,” *Journal of Intelligent Materials Systems and Structures*, Vol. 19, No. 1, January, 2008, pp. 83-91.

Loverich, J.J., G.H. Koopmann, G.A. Lesieutre, J.E. Frank, W. Chen, “A New Piezoelectric Actuator using a Feed-Screw for Quasi-Static Motion Accumulation – Part I: Experimental Development,” *Journal of Intelligent Materials Systems and Structures*, Vol. 19, No. 1, January, 2008, pp. 73-81.

Kinzel, M.P., M.D. Maughmer, G.A. Lesieutre, “Miniature Trailing-Edge Effectors for Rotorcraft Performance Enhancement,” *Journal of the American Helicopter Society*, Vol. 52, No. 2, April, 2007, pp. 146-158.

Kang, H., Smith, E.C., and Lesieutre, G.A., “Experimental and Analytical Study of Blade Lag Damping Augmentation using Chordwise Absorbers,” *Journal of Aircraft*, Vol. 43, No. 1, January 2006, pp. 194-200.

Ramrakhiani, D., G.A. Lesieutre, M. Frecker, and S. Bharti, "Aircraft Structural Morphing Using Tendon Actuated Compliant Cellular Trusses," *Journal of Aircraft*, Vol. 42, No. 6, Nov–Dec 2005, pp. 1615-1621.

Yang, M.Y., G.A. Lesieutre, S.A. Hambric, and G.H. Koopmann, "Development of a Design Curve For Particle Impact Dampers," *Noise Control Engineering Journal*, Vol. 53, No. 1, 2005, pp. 5-13. (**Hirschorn IAC Best Paper Prize, Institute of Noise Control Engineering**)

Ramrakhiani, D., G.A. Lesieutre, and E.C. Smith, "Modeling of Elastomeric Materials Using Nonlinear Fractional Derivative and Continuously Yielding Friction Elements," *International Journal of Solids and Structures*, Vol. 41, July, 2004, pp. 3929-3948.

Lesieutre, G.A., J. Loverich, G.H. Koopmann, and E.M. Mockensturm, "Increasing The Mechanical Work Output Of An Active Material Using A Non-Linear Motion Transmission Mechanism," *Journal of Intelligent Materials Systems and Structures*, Vol. 15, January 2004, pp. 49-58.

Rusovici R., J.J. Dosch, G.A. Lesieutre, "Design Of Single-Crystal Vibration Absorbers," *Journal of Intelligent Materials Systems and Structures*, Vol. 13, No. 11, 2002, pp. 705-712.

Lesieutre, G.A., Hofmann, H., and Ottman, G., "Damping as a Result of Piezoelectric Energy Harvesting," *Journal of Sound and Vibration*, Vol. 269, 2004, pp. 991-1001.

Frank, J.E., G.H. Koopmann, W. Chen, E. Mockensturm, G.A. Lesieutre, and J.Y. Loverich, "Modeling And Design Optimization Of A Bimorph-Driven Rotary Motor," *Journal of Intelligent Materials Systems and Structures*, Vol. 14, No. 4-5, 2003, pp. 217-227.

Szefi, J.T., E.C. Smith, and G.A. Lesieutre, "Formulation and Validation of a Ritz-Based Analytical Model for Design of Periodically Layered Isolators in Compression," *Journal of Sound and Vibration*, Vol. 268, No. 1, 2003, pp. 85-101.

Ottman, G., Hofmann H., and Lesieutre, G.A., "Optimized Piezoelectric Energy Harvesting Circuit Using Step-Down Converter in Discontinuous Conduction Mode," *IEEE Transactions on Power Electronics*, Vol. 18, No. 2, 2003, pp. 696-703.

Lesieutre, G.A., R. Rusovici, G.H. Koopmann, and J.J. Dosch, "Modeling and Characterization of a Piezoceramic Inertial Actuator," *Journal of Sound and Vibration*, Vol. 261, No. 1, 2003, pp. 93-107.

Ottman, G., Bhatt, A., Hofmann H., and Lesieutre, G.A., "Adaptive Piezoelectric Energy Harvesting Circuit for Wireless Remote Power Supply," *IEEE Transactions on Power Electronics*, Vol. 17, No. 5, 2002, pp. 669-676.

Shiue, F.W., C.E. Bakis, G.A. Lesieutre, "A Virtual Containment Strategy For Filament-Wound Composite Flywheel Rotors With Damage Growth," *Journal of Composite Materials*, Vol. 35, No. 9, 2002, pp. 1103-1120.

Brackbill, C.R., E.C. Smith, G.A. Lesieutre, "Application of a Refined Time Domain Elastomeric Damper Model to Helicopter Rotor Aeroelastic Response and Stability," *AHS Journal*, Vol. 47, No. 3, 2002, pp. 186-197.

Shiue, F.W., C.E. Bakis, G.A. Lesieutre, "Condition Monitoring of Filament-Wound Composite Flywheels Having Circumferential Cracks," *Journal of Spacecraft and Rockets*, Vol. 39, No. 2, 2002, pp. 306-313.



Rusovici, R., Lesieutre, G. and Inman, D. J. “Modeling of Shock Propagation and Attenuation in Viscoelastic Components,” *Shock and Vibration Digest*, Vol. 8, No. 5, 2001, pp. 287-302. (**Best Paper, AIAA SDM Conference**)

Lesieutre, G.A., “Damping in Finite Element Models,” *Encyclopedia of Vibration*, Academic Press, Ewins, Rao, Editors, 2001.

Galante, T., J. Frank, J. Bernard, W. Chen, G.A. Lesieutre, and G.H. Koopmann, “A High-Force, High-Displacement Piezoelectric Inchworm Actuator,” *Journal of Intelligent Materials Systems and Structures*, Vol. 10, No. 12, 2000, pp. 962-972.

Brackbill, C., G.A. Lesieutre, E.C. Smith, and L.E. Ruhl, “Characterization and Modeling of the Low Strain Amplitude and Frequency Dependent Behavior of Elastomeric Damper Materials,” *Journal of the American Helicopter Society*, Vol. 45, No. 1, 2000, pp. 34-42.

Davis, C.L. and G.A. Lesieutre, “An Actively Tuned Solid State Vibration Absorber Using Capacitive Shunting of Piezoelectric Stiffness,” *Journal of Sound and Vibration*, Vol. 232, No. 3, 2000, pp. 601-617. (**Best Paper, ASME, Adaptive Structures**)

Klein, T.F., and G.A. Lesieutre, “The Effect of the Low Earth Orbit Space Environment on the Damping of Carbon Reinforced Polymer Composites,” *Journal of Spacecraft and Rockets*, Vol. 37, No. 4, 2000, pp. 519-525.

Zapfe, J.A., and G.A. Lesieutre, “A Discrete Layer Finite Element for the Dynamic Analysis of Composite Sandwich Beams with Integral Damping Layers,” *Computers and Structures*, Vol. 70, 1999, pp. 647-666.

Enelund, M. and G.A. Lesieutre, “Time Domain Modeling of Damping using Anelastic Displacement Fields and Fractional Calculus,” *International Journal of Solids and Structures*, Vol. 36, 1999, pp. 4447-4472.

Hébert, C.A. and G.A. Lesieutre, “Flexural Piezoelectric Transducers With Frequency Agility Obtained Via Membrane Loads,” *Journal of Intelligent Materials Systems and Structures*, Vol. 9, No. 12, December, 1998, pp. 1030-1037.

Lesieutre, G.A., “Vibration Damping and Control using Shunted Piezoelectric Materials,” *Shock and Vibration Digest*, Vol. 30, 1998, pp. 187-195.

Lesieutre, G.A., and C.L. Davis, “Can a Coupling Coefficient of a Piezoelectric Actuator be Higher Than Those of Its Active Material?,” *Journal of Intelligent Materials Systems and Structures*, Vol. 8, 1997, pp. 859-867.

Zapfe, J.A. and G.A. Lesieutre, “Broadband Vibration Damping Using Highly Distributed Tuned Mass Absorbers,” *AIAA Journal*, Vol. 35, No. 4, April 1997, pp. 753-756.

Zapfe, J.A., and G.A. Lesieutre, “Vibration Analysis of Laminated Beams using an Iterative Smeared Laminate Model,” *Journal of Sound and Vibration*, Vol. 199, No. 2, 1997, pp. 275-284.

Lee, U., G.A. Lesieutre, and L. Fang, “Anisotropic Damage Mechanics Based on Strain Energy Equivalence and Equivalent Elliptical Microcracks,” *International Journal of Solids and Structures*, Vol. 34, 1997, pp. 4377-4397.

Brackbill, C.R., G.A. Lesieutre, E.C. Smith, and L.K. Byers, “Thermomechanical Modeling of Elastomeric Materials,” *Smart Materials and Structures*, Vol. 5, 1996, pp. 529-539.

- Lesieutre, G.A., and Lee, U. “A Finite Element Model for Beams Having Segmented Active Constrained Layers with Frequency-Dependent Viscoelastic Material Properties,” *Smart Materials and Structures*, Vol. 5, 1996, pp. 615-627.
- Smith, E.C., M. Beale, K. Govindswamy, M. Vascinec, and G.A. Lesieutre, “Aeroelastic Response and Stability of Helicopters With Elastomeric Lag Dampers,” *AHS Journal*, Vol. 41, No. 3, July, 1996, pp. 257-266. **(Best Paper, AHS Forum, Dynamics)**
- Smith, E.C., M. Beale, K. Govindswamy, M. Vascinec, and G.A. Lesieutre, “Formulation and Validation, and Application of a Finite Element Model for Elastomeric Lag Dampers,” *AHS Journal*, Vol. 41, No. 3, July, 1996, pp. 247-255.
- Zapfe, J.A., and G.A. Lesieutre, “Iterative Calculation of the Transverse Shear Distribution in Laminated Composite Beams,” *AIAA Journal*, Vol. 34, No. 6, June, 1996, pp. 1299-1300.
- Lesieutre, G.A., E. Bianchini and A. Maiani, “Finite Element Modeling of One-Dimensional Viscoelastic Structures using Anelastic Displacement Fields,” *Journal of Guidance, Control and Dynamics*, Vol. 19, No. 3, May-June, 1996, pp. 520-527.
- Yarlagadda, S., M.H.W. Chan, H. Lee, G.A. Lesieutre, and D.W. Jensen, “Low Temperature Thermal Conductivity, Heat Capacity, and Heat Generation of PZT,” *Journal of Intelligent Materials Systems and Structures*, Vol. 6, No. 6, Nov-Dec, 1995, pp. 757-764.
- Lesieutre, G.A., and Govindswamy, K.M., “Finite Element Modeling of Frequency-Dependent and Temperature-Dependent Dynamic Behavior of Viscoelastic Materials in Simple Shear,” *International Journal of Solids and Structures*, Vol. 33, No. 3, 1995, pp. 419-432.
- Lesieutre, G.A., “Modeling Frequency-Dependent Longitudinal Dynamic Behavior of Linear Viscoelastic Long-Fiber Composites,” *Journal of Composite Materials*, Vol. 28, No. 18, 1994, pp. 1770-1782.
- Davis, C.L., and G.A. Lesieutre, “A Modal Strain Energy Approach to the Prediction of Resistively-Shunted Piezoceramic Damping,” *Journal of Sound and Vibration*, Vol. 184, No. 1, 1995, pp. 129-139.
- Lesieutre, G.A., and E. Bianchini, “Time-Domain Modeling of Linear Viscoelasticity using Anelastic Displacement Fields,” *Journal of Vibration and Acoustics*, Vol. 117, No. 4, October, 1995, pp. 424-430.
- Yarlagadda, S., and G.A. Lesieutre, “Fiber Contribution to Modal Damping of Polymer Matrix Composite Panels,” *Journal of Spacecraft and Rockets*, Vol. 32, No. 5, September-October, 1995, pp. 825-831.
- Lesieutre, G.A., “On the Consistency of Complex Moduli for Transversely-Isotropic Viscoelastic Materials,” *Journal of Composite Materials*, Vol. 28, No. 5, 1994, pp. 382-391.
- Lesieutre, G.A., S. Yarlagadda, S.K. Kurtz, S. Yoshikawa and Q.C. Xu, “Passively-Damped Structural Composite Materials using Resistively-Shunted Piezoceramic Fibers,” *ASM Journal of Materials Engineering and Performance*, Vol. 2, No. 6, December, 1993, pp. 887-892.
- Lesieutre, G.A., S. Yarlagadda, D. Christiansen and W. Whatley, “Enhanced Composite Plate Damping using Intercalated Graphite Fiber,” *AIAA Journal*, Vol. 31, No. 4, April, 1993, pp. 746-750.

Lesieutre, G.A., “A Bilinear Variational Principle Governing Longitudinal Vibration of Rods with Frequency-Dependent Material Damping,” *Journal of Applied Mechanics*, Vol. 60, No. 1, 1993, pp. 210-211.

Lesieutre, G.A., “Finite Elements for Dynamic Modeling of Uniaxial Rods with Frequency-Dependent Material Properties,” *International Journal of Solids and Structures*, Vol. 29, No. 12, 1992, pp. 1567-1579.

Lesieutre, G.A., A.J. Eckel, and J.A. DiCarlo, “Damping of Bromine-Intercalated P-100 Graphite Fibers,” *Carbon*, Vol. 29, No. 7, 1991, pp. 1025-1032.

Lesieutre, G.A., and D.L. Mingori, “Finite Element Modeling of Frequency-Dependent Material Damping using Augmenting Thermodynamic Fields,” *Journal of Guidance, Control and Dynamics*, Vol. 13, No. 6, November-December, 1990, pp. 1040-1050.

### **Other publications and patents**

Sater, J.M., Lesieutre, G.A., and Martin, C., “A Smarter Transition for Smart Technologies,” *Aerospace America*, Vol. 44, No. 6, June, 2006, pp. 18-21.

Lesieutre, G.A., “Structural Dynamics,” *Aerospace America*, December 1993, p. 79.

Lesieutre, G.A., “Comment on 'Material Damping in Simple Structures in a Simulated Space Environment',” *Journal of Spacecraft and Rockets*, Vol. 24, No. 3, May-June, 1987.

Lesieutre, G.A., and J.L. Kauffman, “Reduction of (Turbomachinery) Blade Vibration Response ...,” PSU Invention Disclosure, 15 July 2010.

Frank, J., G.H. Koopmann, G.A. Lesieutre, W. Chen, E.M. Mockensturm, “Smart Material Motor with Mechanical Diodes,” U.S. Patent, August 6, 2002, U.S. Serial No. 6,429,573.

Lesieutre, G.A., and C.L. Davis, “A Transducer Having a Coupling Coefficient Higher Than That of Its Active Material,” U.S. Patent, May 22, 2001, U.S. Serial No. 6,236,143.

Lesieutre, G.A., C.L. Davis, and J.J. Dosch, “Piezoceramic Vibration Control Device and Tuning Control Thereof,” U.S. Patent, February 27, 2001, U.S. Serial No. 6,193,032.

**Proceedings Papers and Conference Presentations**

More than 210 proceedings papers or conference presentations (if no paper).

University seminars are not listed.

A complete list can be furnished. A few selected papers follow.

Kauffman, J.L., G.A. Lesieutre, “Vibration Reduction of Turbomachinery Bladed Disks with Changing Dynamics using Piezoelectric Materials,” 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Denver, CO, April 4-7, 2010. (submitted)

Cirone, S.A., M. Frecker, G.R. Hayes, B.L. Babcox, J.H. Adair, G.A. Lesieutre, “Design, Fabrication and Testing of Contact-Aided Compliant Cellular Mechanisms with Curved Walls,” SPIE Smart Materials and Structures Conference, March 7-10, 2011, San Diego, CA. (submitted)

Mehta, V., M. Frecker, G.A. Lesieutre, “Design, Fabrication, and Testing of Meso-scale Cellular Contact-Aided Compliant Mechanisms,” Proceedings of ASME 2010 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS10-3743, September 28-October 1, 2010, Philadelphia, Pennsylvania.

Kauffman, J.L., G.A. Lesieutre, “How Biaxial Membrane Loads Influence the Modal Damping of Flexural Structures,” 16th US National Congress on Theoretical and Applied Mechanics, June 27 - July 2, 2010, University Park, PA. Paper USNCTAM2010-1396.

Lesieutre, G.A., “Piezoelectric Devices for Helicopter and Turbomachinery Blade Response Reduction,” at the ESF-NSF Smart Structural Systems Technologies Workshop (S3T-2010), University of Porto, Portugal, 6-9 April 2010.

Han, Dong, J. Wang, E.C. Smith, and G.A. Lesieutre, “Transient Loads Control of a Variable Speed Rotor during Lagwise Resonance Crossing,” AHS Aeromechanics Specialists Conference, San Francisco, CA, January 20-22, 2010.

Kauffman, J.L., and G.A. Lesieutre, “Reduction of High-Cycle Fatigue in Integrally Bladed Rotors through Piezoelectric Vibration Damping,” 20th International Conference on Adaptive Structures and Technologies, October 20-22, 2009, Hong Kong.

Thiel, M., G.A. Lesieutre, “New Actuation Methods for Miniature Trailing-Edge Effectors for Rotorcraft,” AIAA-2009-2104, 50th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Palm Springs, California, May 4-7, 2009.

Marr, C., G.A. Lesieutre, and E.C. Smith, “Nonlinear, Temperature Dependent, Fluidlastic Lead-Lag Damper Modeling,” American Helicopter Society 64th Annual Forum, Montreal, May, 2008.

Lesieutre, G.A., Future Flight Structures Research for the Next Half-Century, Special Session, AIAA SDM Conference, Panel Member, April, 2008.

Kauffman, J.L., and G.A. Lesieutre, “A Nonlinear Model of a Bimorph-Based Piezoelectric Energy Harvesting Device,” 18th International Conference on Adaptive Structures and Technologies (ICAST), Ottawa, Canada, October 3-5, 2007.

Lesieutre, G.A., J. Browne, and M. Frecker, “Scaling of Performance, Weight and Actuation of a 2-D Compliant Cellular Frame Structure for a Morphing Wing,” 17th International Conference on Adaptive Structures and Technologies (ICAST), Taipei, Taiwan, October 16-19, 2006.

Lesieutre, G. A., H. F. Hofmann, J. E. Frank, Y. Liu, and G. H. Koopmann “Piezoelectric Energy Harvesting for Vibration Control, Wireless Sensor Networks, and Resource Conservation” at Engineered Adaptive Structures V, Maori, Italy, June 19-23, 2006.

Szefi, J.T., E.C. Smith, G.A. Lesieutre, A. Badre-Alam, and D. McGuire, “Design Of Fluidic, High-Frequency Periodically Layered Isolators For Model 427 Gearbox Isolation,” 62nd American Helicopter Society Annual Forum, May 2006, pp. 954-964.

Thiel, M., and G.A. Lesieutre, “Actuation of an Active Gurney Flap for Rotorcraft Applications,” AIAA-2006-2181, 47th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Newport, RI, May, 2006.

Lesieutre, G.A., H. Hofmann, Y. Liu, G.H. Koopmann, J. Frank, “Piezoelectric Energy Harvesting For Wireless Sensor Networks,” ICAST 2005, Paris, October 10-12, 2005.

Le Hen, F., E. Smith, G.A. Lesieutre and J. Szefi, “Actively Enhanced Periodically Layered Isolator for Helicopter Gearbox Isolation,” AIAA-2005-2250, 46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conf., Austin, TX, April 18-21, 2005.

Kinzel, M., M.D. Maughmer, G.A. Lesieutre, and E. Duque, “Active Gurney Flap Aerodynamics,” AIAA Aerospace Sciences Meeting, Reno, NV, January 10-13, 2005

Rusovici, R., and G.A. Lesieutre, “Design of a Single-Crystal Piezoceramic-Driven, Synthetic-Jet Actuator,” SPIE 11th Annual International Symposium on Smart Structures and Materials, San Diego, CA, March 14-18, 2004.

Bernard, J. and Lesieutre, G.A., “Variable Frequency Flexural Piezoelectric Transducers For High Power Linear Chirp Transmission,” 11th International Conference on Adaptive Structures Technology (ICAST), Nagoya, Japan, October 23-26, 2000.

Ruhl, L.E., E.C. Smith, G.A. Lesieutre, and C.R. Brackbill, “Temperature-Dependent Behavior of Elastomeric Damper Materials,” proceedings of the 40th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, St. Louis, MO, April 12-15, 1999. .

Bernard, J.E. and G.A. Lesieutre, “Active Broadband Force Isolation Using a Flexible Piezoelectric Actuator,” proceedings of the AIAA/ASME/AHS Adaptive Structures Forum, St. Louis, MO, April 12-15, 1999.

Lesieutre, G.A, L. Fang, and U. Lee, “Hierarchical Failure Simulation for Machinery Prognostics,” proceedings of the 51st Meeting of the Machinery Failure Prevention Technology Society, Virginia Beach, VA, April 15-17, 1997.

Yarlagadda, S., G.A. Lesieutre, S. Yoshikawa, and J. Witham, “Resistively-Shunted Piezocomposites for Passive Vibration Damping,” proceedings of the 37th AIAA/ASME Adaptive Structures Forum, Salt Lake City, UT, April 18-19, 1996, pp. 217-227.

Lesieutre, G.A., S.P. Pai, L. Fang, S. Yoshikawa, G. Koopmann, “Heat Generation of a Piezoceramic Induced-Strain Actuator Embedded in a Glass/Epoxy Panel,” proceedings of the 1996 North American Conference on Smart Structures and Materials, San Diego, CA, February 25-29, 1996.

### Grants and Contracts In Progress

“Penn State Wind for Schools Program,” NREL, \$60,000, 8/10-7/13, co-PI, 20%.

“Wind Energy Workforce Development: Engineering, Science, & Technology: Meeting the Needs of the Future, Now,” DOE, \$400,000, 1/10-12/11, co-PI, 50%.

“High-Strength High-Strain Structures Using Ceramic Cellular Contact-Aided Compliant Mechanisms (C3M),” NSF, \$622,554, 5/09-4/12, co-PI (with M. Frecker, J. Adair), 33%. (plus \$50,000 REU supplement)

“Workshop on Multifunctional Materials and Distributed Renewable Energy for Sustainable Infrastructure,” NSF, \$50,000, 4/09-1/11, PI, 100%.

“Reduction of High-Cycle Fatigue in Integrally Bladed Rotors through Piezoelectric Vibration Damping and Control,” NASA Glenn (J. Kauffman NASA GSRP award), \$30,000 annually, 8/08-8/11, PI, 100%.

“Rotorcraft Elastomeric Component Research,” Lord Corporation, \$50,000 annually, 1/07-1/12, co-PI (with E.C. Smith), 50%.

“Penn State Rotorcraft Center of Excellence,” U.S. Army, Faculty Associate (3 tasks: adaptive mount, active Gurney flap, in-blade vibration absorber), \$50,000 annually (plus \$15,000 matching), 1/07-1/12, task PI, 100%.

### Grants and Contracts Completed

“Joint ESF-NSF Workshop on the Applications of Adaptive Structures and Materials to Sustainable Energy and the Built Environment,” NSF, \$40,000 (plus \$56,000 from ESF), 9/08-1/09, PI, 100%.

“Fatigue Testing for Composite Structural Durability Analysis,” Rhombus Consultants Group (Phase II SBIR, U.S. Navy), \$138,954, 7/06-5/08, co-PI (with C.E. Bakis), 20%.

“Actuation of an Active Gurney Flap for Rotorcraft Applications,” NASA Ames (M. Thiel NASA GSRP award), \$26,000 annually, 8/05-8/08, 100%.

“Low Cost Vibration Power Harvesting for Industrial Wireless Sensors,” KCF Technologies (Phase II STTR, DOE), \$347,965, 9/05-9/08, co-PI (with H. Hofmann), 50%.

“Compliant Frame: A New Paradigm To Enable Reconfigurable Aircraft Structures,” AFOSR, \$631,559, 1/05-11/07, co-PI (with M. Frecker), 50%.

“Lag Damping Research,” Bell Helicopter Textron, \$20,000 annually, 1/07-1/09, co-PI (with E.C. Smith), 50%.

“Penn State Rotorcraft Center of Excellence,” NASA Ames, Faculty Associate (3 tasks: adaptive mount, active Gurney flap, in-blade vibration absorber), \$50,000 annually (plus \$15,000 matching), 1/01-1/07, 100%.

“Blade-Mounted Vibration Absorbers for Lag Damping,” Lord Corporation, \$20,000 annually, 1/01-1/06, co-PI (with E.C. Smith), 50%.

“Layered High-Frequency Gearbox Isolation Mounts,” Invercon (Lord Corporation (RITA)), \$60,000, 1/05-12/05, co-PI (with E.C. Smith), 50%.

“Fatigue Testing for Composite Structural Durability Analysis,” Rhombus Consultants Group (Phase I SBIR, U.S. Navy), \$24,000, 4/05-9/05, co-PI (with C.E. Bakis), 50%.

“Low-Cost Autonomous Wireless Sensors With Integrated Vibration Power Harvesting,” KCF Technologies (Phase I STTR, DOE), \$33,132, 7/04-4/05, co-PI (with H. Hofmann), 50%.

“Tendon-Actuated Compliant Cellular Truss: Controlled Conformity in 3-D Shape-Changing Structures,” NASA (DARPA Morphing Aircraft Structures), \$508,958, 1/03-12/05, co-PI (with M. Frecker), 50%.

“Layered High-Frequency Gearbox Isolation Mounts,” Invercon (Lord Corporation (RITA)), \$60,000, 1/04-12/04, co-PI (with E.C. Smith), 50%.

“Rotor Damping Technology,” Bell Helicopter (RITA), \$60,000, 1/04-12/04, co-PI (with E.C. Smith), 50%.

“Energy Harvesting from a Backpack,” Office of Naval Research, 10/03 - 09/04, \$5,500, Faculty Associate (with Q. Zhang and H. Hofmann), 100%.

“High Torque Single Crystal PMN-PT Driven Motor to Morph Naval Flow Control Surfaces,” KCF Technologies (U.S. Navy, Phase I SBIR), \$15,000, 6/02-12/02, co-PI (with G.H. Koopmann), 50%.

“Time-Domain Damper Modeling for Fluidlastic Lag Dampers,” Bell Helicopter, \$64,000, 12/02-3/03, co-PI (with E.C. Smith), 50%.

“Frequency Agile Vibration Absorber Utilizing Single-Crystal Piezoceramic,” STI Technologies (DARPA Phase I SBIR), \$10,000, 3/01-11/01, 100%.

“Mechanical Diode Resonant Rectifying Actuator (MEDIRRA),” Army Research Office (DARPA), \$672,500 (plus \$48,000 PSU match), 6/00-12/02, Principal Investigator (with G.H. Koopmann), 50%.

“Acoustic Transduction,” Office of Naval Research (MURI), 8/96-12/01, Faculty Associate \$1,000,000 annually to PSU, (with K. Uchino et al.), \$80,000 annually (with G.H. Koopmann), 50%.

“Piezomotor Electronics,” Wilcoxin Research (DARPA Phase 1 SBIR), \$15,000, 10/99-7/00, co-PI (with G.H. Koopmann), 50%.

“Smart Aircraft and Marine Propulsion Structures (SAMPSON),” Boeing St. Louis (DARPA), \$1,132,000, 9/97-9/01, co-PI (with G.H. Koopmann), 50%.

“Innovative Design, Analysis and Experimental Validation of Energy Reclamation for Acoustic Signature Reduction,” University of Florida (Office of Naval Research), \$87,000, 5/99-3/01, co-PI (with H. Hofmann). 50%.

“Penn State Rotorcraft Center of Excellence,” NASA Ames, \$37,000 annually (plus \$12,000 PSU matching), 1/96-12/00, Faculty Associate (with E.C. Smith, L.N. Long, PIs), 100%.

“2000 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$32,000, 1/00-1/01, co-PI, (with D.L. Hall, et al.), 33%.

“Health Monitoring and Virtual Containment for Composite Flywheel Energy Storage System,” Applied Materials Technologies, Inc. (U.S. Air Force Phase II STTR program) \$198,000, 1/98-6/01, co-PI (with C.E. Bakis), 50%.

“Characterization and Modeling of Layered Elastomeric Mounts,” United Technologies Research Center, \$90,000, 6/98–12/00, co-PI (with E.C. Smith), 50%.

“Blade-Mounted Vibration Absorbers for Lag Damping,” Lord Corporation, \$20,000, 6/99-6/00, co-PI (with E.C. Smith), 50%.

“Elastomeric Modeling Research,” Lord Corporation, \$20,000, 1/00-12/00, co-PI (with E.C. Smith), 50%.

“1999 ONR High School Summer Intern Program in Engineering and Technology, Office of Naval Research, \$43,000, 1/99-1/00, co-Principal Investigator, (with D.L. Hall, et al.), 33%.

“Elastomeric Modeling Research,” Lord Corporation, \$20,000, 1/99-12/99, co-PI (with E.C. Smith), 50%.

“Defense University Research Instrumentation Program (DURIP),” Army Research Office, \$250,000 (plus \$250,000 PSU matching), 1/98-12/99, co-PI (with E.C. Smith, et al), 20%.

“Piezoelectric Isolation for Precision Spacecraft Payloads,” EMF Technologies, (Phase I STTR with NASA Langley Research Center, \$30,000, 1/99-8/99, Principal Investigator.

“Elastomeric Modeling Research,” Lord Corporation, \$20,000, 1/98-12/98, co-PI (with E.C. Smith), 50%.

“1998 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$43,000, 1/98-1/99, co-Principal Investigator, (with D.L. Hall, et al.), 33%.

“Active Noise and Vibration Control: Improved Sensors, Measurements and Control Strategies,” PCB Piezotronics (NSF, Phase II SBIR), \$150,000 (of PCB \$300,000), 5/96-12/98, Principal Investigator (with G.H. Koopmann), 50%.

“Hierarchical Mechanical Modeling,” task on larger project “Integrated Predictive Diagnostics MURI,” Office of Naval Research, \$100,000, 4/95-4/98, Research Associate (with D. Hall et al), 100%.

“Health Monitoring and Virtual Containment for Composite Flywheel Energy Storage System,” Applied Materials Technologies, Inc. (U.S. Air Force Phase I STTR program) \$42,000, 7/96-12/97, co-Principal Investigator (with C.E. Bakis), 50%.

“Experimental Characterization and Analytical Modeling of Elastomeric Mounts,” United Technologies Research Center, \$20,000, 6/97-12/97, co-PI (with E.C. Smith), 50%.

“1997 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$43,000, 1/97-1/98, co-Principal Investigator, (with D.L. Hall, et al.), 50%.

“Elastomeric Component Technology,” United Technologies Research Center, \$10,000, 11/96-3/97 (with E.C. Smith), 50%.

“Experimental Characterization and Analytical Modeling of Elastomeric Dampers and Bearings,” Boeing Helicopters, \$35,000, 12/95–12/96, co-PI (with E.C. Smith), 50%.



“Synthesis and Processing of Intelligent Cost Effective Structures (SPICES) II,” McDonnell Douglas Corporation (DARPA), \$100,000, 4/96-12/96, co-Principal Investigator (with G.H. Koopmann), 50%.

“High Power Density Piezoelectric Actuator for Noise and Vibration Reduction,” PCB Piezotronics (NASA, Phase II SBIR), \$250,000 (of PCB \$500,000), 5/94-3/96, Principal Investigator (with G.H. Koopmann, S. Yoshikawa), 40%.

“1996 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$43,000, 1/96-1/97, co-Principal Investigator, (with R.J. Hansen, et al.), 50%.

“Education in Design for Manufacturing,” PSU part of ECSEL coalition to ARPA (TRP program), \$300,000 of \$1,500,000, 6/94-3/96 (with T. Litzinger, et al.), 13%.

“Synthesis and Processing of Intelligent Cost Effective Structures (SPICES),” McDonnell Douglas Corporation (DARPA), \$1,200,000 (\$720,000, \$480,000 PSU in-kind), 6/93-3/96, co-Principal Investigator (with G.H. Koopmann), 40%.

“Refined Modeling for the Aeroelastic and Aeromechanical Analysis of the RAH-66 Comanche Snubber-Damper for 2GCHAS,” Advanced Rotorcraft Technology (U.S. Army), \$18,100, 1/95-12/95, co-Principal Investigator (with E.C. Smith), 50%.

“Experimental Characterization and Analytical Modeling of Elastomeric Dampers and Bearings,” Boeing Helicopters, \$35,000, 12/94-12/95, co-PI (with E.C. Smith), 50%.

“1995 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$42,000, 1/95-1/96, co-Principal Investigator, (with R.J. Hansen, et al.), 50%.

“Passive Vibration Damping Materials: Piezoelectric Ceramic Composites for Vibration Damping Applications (renewed),” Office of Naval Research, \$247,200, 2/93-7/95, Faculty Associate (with S.K. Kurtz and S. Yoshikawa), 18%.

“Damped Composite Honeycomb Sandwich Panels for High-Speed Aircraft Interior Noise Reduction,” Boeing Commercial Airplane Group, \$90,100, 11/93-6/95, PI, 100%.

“Refined Modeling for the Aeroelastic and Aeromechanical Analysis of Helicopters with Elastomeric Lag Dampers,” Sikorsky Aircraft, \$15,000, 3/94-10/94, co-Principal Investigator (with E.C. Smith), 50%.

“1994 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$41,000, 1/94-1/95, co-Principal Investigator, (with R.J. Hansen, et al.), 50%.

“LEADA: Laboratory for Electronic Aircraft Design Apprenticeship,” CBEL - Teaching and Learning Technologies Group, 3/92-3/94, in-kind, Content Expert (with L.N. Long), 50%.

“Integrally-Shunted Piezoelectric Reinforcement for Tailored Frequency-Dependent Passive Damping of Composite Materials,” National Science Foundation Small Grants for Exploratory Research Program, \$25,000, 9/92-2/94, Co-PI (with S. Yoshikawa), 78%.

“ATF-Based Viscoelastic Plate Finite Element,” Centro Italiano Ricerche Aerospaziali, \$96,240, 6/92-2/94, Principal Investigator, 100%.

“Cryogenic Characterization of Thermal Properties of Piezoelectric Ceramics,” McDonnell Douglas Astronautics, 1/93-10/93, \$50,000, co-Principal Investigator on PSU project, (with D.W. Jensen and M. Chan (Physics)), 22%.

“Piezoelectric Damping and Actuation Module for Noise and Vibration Control,” PCB Piezotronics (NSF, Phase I SBIR), \$16,700 (of PCB \$50,000), 1/93-8/93, Principal Investigator on PSU project (with G.H. Koopmann), 50%.

“High Power Density Piezoelectric Actuator for Noise and Vibration Reduction,” PCB Piezotronics (NASA, Phase I SBIR), \$15,070 (of PCB \$45,210), 2/93-9/93, Principal Investigator on PSU gift project (with G.H. Koopmann), 50%.

“1993 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$35,000, 1/93-1/94, co-Principal Investigator, (with R. Stern, et al.), 50%.

“LIDAR and RADAR Sounder (LARS),” Department of Energy, \$708,000, 10/92- 5/93, Faculty Associate (Mechanical Systems, with C.R. Philbrick et al.), \$18,100, 100%.

“Dynamics and Control Laboratory for Research in Three-Dimensional Rotational Motions,” National Science Foundation Engineering Research Equipment Grants Program, \$80,200, 8/91-1/93, co-Principal Investigator (with R.C. Thompson, R.G. Melton and A.K. Amos), 25%.

“1992 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$35,000, 1/92-1/93, co-Principal Investigator, (with R. Stern, et al.), 50%.

“Passive Vibration Damping Materials: Piezoelectric Ceramic Composites for Vibration Damping Applications,” Office of Naval Research, 3/92-12/92, \$102,200, Faculty Associate (with S.K. Kurtz and S. Yoshikawa (MRL)), 13%.

“Automated Vibration and Environmental Control System for Material and Structural Damping Research,” National Science Foundation Engineering Research Equipment Grants Program, \$74,500, 8/90-6/92, Principal Investigator (with R.C. Thompson and A.K. Amos), 34%.

“Matching Funds for Aerospace Engineering Structures, Dynamics and Controls Equipment,” State of Pennsylvania, \$10,000, 1991, Contributor. (With D.K. McLaughlin, A.K. Amos, R. Auhl.)

“1991 ONR High School Summer Intern Program in Engineering and Technology,” Office of Naval Research, \$35,000, 1/91-1/92, co-PI, (with R. Stern, et al.), 50%.

“The Fiber Contribution to Composite Material Damping,” SPARTA, Inc., \$50,100, 3/90-5/91, Principal Investigator, 100%.

“High Damping Graphite Fiber and Structural Composite Material,” \$470,000 (Phase II SBIR), Principal Investigator and Program Manager. (at SPARTA, Inc.; in progress November, 1989.)

“High Damping Graphite Fiber,” Naval Surface Warfare Center, \$50,000 (Phase I SBIR), Principal Investigator. (at SPARTA, Inc.; completed March, 1988.)

“Generic Satellite Laser Vulnerability,” Air Force Weapons Laboratory, \$450,000, co-Principal Investigator and Program Manager. (at SPARTA, Inc.; completed February, 1989.)

“Carbon-Carbon and MMC for Space Structures,” Naval Surface Warfare Center, \$490,000, Principal Investigator and Program Manager. (at SPARTA, Inc.; completed August, 1989.)

More than 80 research proposals were declined.

**Courses Taught** (Aerospace Engineering, unless noted)

001S	Aerospace Explorer (First-Year Seminar)
EMch 212	Dynamics
301	Aerospace Structures I
302	Aerospace Structures II (now AERSP 470)
406	Structures Laboratory (now AERSP 305W)
497F	Advanced Composite Structures
460	Automatic Controls
402A	Aircraft Preliminary Design
402B	Aircraft Detail Design
420	Flight Testing
571	Structural Dynamics
597D	Passive Damping and Vibration Control
597F	Advanced Composite Structures
597A	Control of Flexible Structures

Numerous guest lectures in English 202C, Technical Writing.

Numerous guest lectures in Higher Education 597A, Planning, Budgeting, and Strategic Management.

**Theses Supervised**

Jeffrey A. Zapfe	Ph.D.	12/95	Prediction of Damping in Laminated Beams Using a Discrete Layer Finite Element Model and an Iterative Full Domain Smeared Laminate Model
Kiran Govindswamy	Ph.D.	12/95	Modeling of Strain-, Temperature-, and Frequency-Dependent Properties of Elastomeric Damper and Bearing Materials (co-advisor)
Suresh Pai	Ph.D.	12/96	Detecting Buckling in Filament-Wound Cylinders using Embedded Fiber-Optic Sensors (co-chair)
Christopher Davis	Ph.D.	12/97	A Tunable Solid State Piezoceramic Vibration Absorber
Shridhar Yarlagadda	Ph.D.	12/99	Resistively Shunted Piezocomposites for Passive Damping
Razvan Rusovici	Ph.D.	5/00	Dynamic Effects of an Elastomeric O-Ring in a Hopkinson Bar (co-advisor; Virginia Tech degree program)
Christian Brackbill	Ph.D.	12/00	Effects of Nonlinear Elastomeric Damper Behavior on Rotor Dynamics (co-advisor)
Julien Bernard	Ph.D.	5/01	Design and Realization of Actively Tunable Sonar Transducers
Jeremy Frank	Ph.D.	5/01	Design and Development of Piezoelectric Motors (co-advisor)

Hao Kang	Ph.D.	8/01	Rotor Blade Lag Damping Using Embedded Chordwise Absorbers (co-advisor)
Fuh-Wen Shiue	Ph.D.	12/01	Virtual Containment of Composite Flywheels for Integrated Power and Attitude Control of Spacecraft (co-advisor)
Joe Szefi	Ph.D.	8/03	Helicopter Gearbox Isolation Using Periodically Layered Fluidic Isolators (co-advisor)
Mike Yang	Ph.D.	8/03	Development of Master Design Curves for Particle Impact Dampers (co-advisor)
Jacob Loverich	Ph.D.	8/04	High Power Density Piezoelectric Motor with Hybrid Clamps (co-advisor)
Deepak Ramrakhyani	Ph.D.	5/05	Tendon-Actuated Compliant Truss for Morphing Aircraft Structures
Smita Bharti	Ph.D.	5/07	Optimal Structural Design Of A Morphing Aircraft Wing (co-advisor)
Vipul Mehta	Ph.D.	8/10	Contact-Aided Stress Relief in Compliant Mechanisms (co-advisor)
Michael Thiel	Ph.D.	5/11	Actuation for an Active Gurney Flap for Rotorcraft
Conor Marr	Ph.D.	5/11	Semi-Active Lag Damping (co-advisor)
Jeffrey Kauffman	Ph.D.	5/11	Piezoelectric Damping of Turbomachinery Blades
Shridhar Yarlagadda	M.S.	12/91	Fiber Contribution to Flexural Damping of Polymer-Matrix Composites
Kiran Govindswamy	M.S.	5/92	A Subresonant Method for Measuring Material Damping in Low-Frequency Uniaxial Vibration
Christopher Davis	M.S.	3/93	Frequency-Shaped Passive Damping using Resistively-Shunted Piezoceramics
Tom Manning	M.S.	8/93	Design, Manufacture, and Testing of Volume Scanning Mechanisms for LIDAR and RADAR Sounder
Emanuele Bianchini	M.S.	12/93	Dynamic Modeling of Viscoelastic Materials and Structures using Anelastic Displacement Fields
Scott Parent	M.S.	12/94	Validated Modeling of Space Truss Dynamics
Michael Beale	M.S.	8/95	Characterization of the Amplitude-Dependent Dynamic Behavior of Elastomeric Materials used in Rotorcraft Lag Dampers (co-advisor)
Razvan Rusovici	M.S.	12/95	Modeling and Characterization of Inertial Piezoceramic Actuators
Moreshwar Deshpande	M.S.	8/95	Mechanical Interaction of an Embedded Induced Strain Actuator with a Host Composite Structure (co-advisor)
Brian Dershem	M.S.	5/96	Characterization of an Embeddable Induced Strain Actuator (co-advisor)

Thomas Klein	M.S.	5/96	Effects of the Space Environment on the Dynamic Properties of Graphite/Epoxy Composites
Christian Brackbill	M.S.	12/96	Formulation and Validation of a Thermomechanical Model for Elastomeric Materials (co-advisor)
Lynn Byers	M.S.	5/97	Thermomechanical Characterization of Elastomeric Damper and Bearing Materials (co-advisor)
Tim Galante	M.S.	5/97	Design of a Piezoelectric Inchworm Actuator for Dynamic Forcing Capability (co-advisor)
Hao Sun	M.S.	5/98	Failure Modeling for Machinery Prognostics Using Component Damage Modes
Jeremy Frank	M.S.	5/98	Optimization of Inchworm Drive Signals for High Force Performance (co-advisor)
Julien Bernard	M.S.	7/98	Dynamic Force Isolation using Piezoelectric Proof Mass Actuation (co-advisor)
Kati Hufnagel	M.S.	7/98	Dynamic Analysis of Stiffened Panel Structures Using Component Mode Synthesis (co-advisor)
L. Eric Ruhl	M.S.	9/98	Characterization and Modeling of the Thermo-Mechanical Behavior of Elastomers in the Low Dynamic Strain Regime (co-advisor)
Chad Hébert	M.S.	12/98	Frequency-Agile Piezoceramic Transducers Obtained Through Application of In-Plane Loads
Sumit Sarkar	M.S.	12/98	Two-Dimensional FE Modeling of Elastomeric Components with Pre-Stress (co-advisor)
Joe Szefi	M.S.	5/00	High Frequency Dynamic Behavior of Elastomeric Mounts (co-advisor)
David Ericson	M.S.	5/02	Use of Superelastic SMA as a High-Strain-Capable Structural Material in Adaptive Structures (co-advisor)
Deepak Ramrakhyani	M.S.	5/02	An Efficient Nonlinear Model of Dynamic Elastomer Behavior using Fractional Derivatives and Plastic Yielding (co-advisor)
Geff Ottman	M.S.	5/02	A Standalone Piezoelectric Energy Harvesting Circuit for Wireless, Remote Power Supply (co-advisor)
Jacob Loverich	M.S.	8/02	A Reversible, Linear Mechanical Diode for High Power Density Piezoelectric Motors (co-advisor)
Tom Leffler	M.S.	8/03	Mechanical Fusing for Predictable Failure of Composite Flywheels (co-advisor)
Kristin Culler	M.S.	12/03	Active Isolation using a Piezoelectric Stack with Motion Amplification
Jason Petrie	M.S.	5/04	Blade-Embedded Vibration Absorber for Rotorcraft Lag Damping (co-advisor)
Sanjiv Ramachandran	M.S.	5/04	Nonlinear Dynamics and Damping Performance of an Impact Damper

François LeHen	M.S.	5/05	An Actively-Tuned Periodically-Layered Fluid-Elastic Mount for Helicopter Gearbox Isolation (co-advisor)
Michael Thiel	M.S.	5/06	Actuation for an Active Gurney Flap for Rotorcraft
Jamie Browne	M.S.	8/07	Scaling of Structural Concepts for Morphing Airframes
Jeffrey Kauffman	M.S.	12/07	Piezoelectric Vibration Energy Harvesting for Wireless Sensor Nodes
Conor Marr	M.S.	12/07	Frequency Domain Modeling of Fluidlastic Lead-Lag Dampers (co-advisor)
Joseph Shenglan Wang	M.S.	5/10	Experiments with Blade-Embedded Fluidic Vibration Absorbers (co-advisor)
Samantha Cirone	M.S.	5/11	Design, Fabrication and Testing of C3M Parts with Curved Walls (co-advisor)
Pauline Autran	M.S.	5/12	Radial Layered Piezo-Fluidic Bearings for Helicopter Interior Noise Reduction (co-advisor)
Bob Grogan	B.S.	5/92	Thermally-Induced Vibration of Flexible Spacecraft Solar Array Booms
Tom Reising	B.S.	8/92	Experimental Determination of Resonance Frequencies and Damping of Graphite/BMI Plates
Albert Turney	B.S.	12/94	Visualization of Wave Propagation in a Viscoelastic Rod
Andrew Foose	B.S.	12/95	Redesign of the Bell/Boeing V-22 “Osprey” FS-535 Cargo Floor Frame
Tom Leffler	B.S.	5/97	A Virtual Containment System for Spacecraft Energy Storage and Momentum Management (co-advisor)
Smith Thepvongs	B.S.	5/02	A Piezoelectric Bender for Gurney Flap Actuation
Tom Jakub	B.S.	5/03	Active Isolation of Flywheel Vibration using Piezoelectric Mounts
Alicia Cole-Quigley	B.S.	5/04	Modeling of Non-Linear Solar Sail Deformation
Jamie Browne	B.S.	12/04	Analysis And Testing Of An Isogrid-Paneled Nano-Satellite Structure
Aimy Wissa	B.S.	12/08	Damage Detection in Aluminum Plates Using the Electro-Mechanical Impedance Method

Served on more than 60 additional graduate student thesis committees.

Served as the “faculty opponent” at a Ph.D. defense at Chalmers University of Technology, Gothenburg, Sweden, May, 1997.

Served as the “external examiner” at a Ph.D. defense at the Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, November, 2006.

Served as the “faculty opponent” at a Ph.D. defense at Chalmers University of Technology, Gothenburg, Sweden, February, 2007.