

# JOHN LAMBROS

Aerospace Engineering  
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## Education

- Ph.D.           Aeronautics, California Institute of Technology, 1994  
Thesis : *Dynamic decohesion of bimaterial interfaces*  
Minor Subject : Materials Science  
Advisor : Prof. Ares J. Rosakis
- M.S.            Aeronautics, California Institute of Technology, 1989
- B.Eng.         Aeronautical Engineering, Imperial College of Science and Technology, London, 1988  
Degree awarded with First Class, Honors  
Thesis: *Measurement of the strength of adhesive bonded joints and the shear lag method for predicting strength*

## Employment

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|--------------|----------------------------|---|
| 2007-present | <i>Professor</i>           | Aerospace Engineering<br>University of Illinois at Urbana-Champaign                         |
| 2006-present | <i>Affiliate Professor</i> | Computational Science and Engineering Program<br>University of Illinois at Urbana-Champaign |
| 2002-present | <i>Affiliate Professor</i> | Mechanical Science and Engineering<br>University of Illinois at Urbana-Champaign            |
| 2000-2007    | <i>Associate Professor</i> | Aerospace Engineering<br>University of Illinois at Urbana-Champaign                         |
| 2000-2001    | <i>Affiliate Professor</i> | Mechanical Engineering<br>University of Delaware  |
| 1995-2000    | <i>Assistant Professor</i> | Mechanical Engineering<br>University of Delaware  |
| 1994-1995    | <i>Research Fellow</i>     | Aeronautics<br>California Institute of Technology   |

## Honors and Awards

- |   |                                    |
|---|------------------------------------|
| Hetényi Award, Society for Experimental Mechanics                                       | 2012                               |
| Associate Technical Editor for ASME JOURNAL OF APPLIED MECHANICS                        | 2011-                              |
| Participant, Engineering Faculty Leadership Forum, College of Engineering, UIUC         | 2010                               |
| Fellow, ASME  | 2009                               |
| Executive Board Member, Society for Experimental Mechanics                              | 2008-2010                          |
| Xerox award for faculty research, UIUC  | 2007                               |
| One of the most cited papers (Vol. 69, pp. 1695-1711) in Engineering Fracture Mechanics | 2002-2005                          |
| AIAA UIUC teacher of the year award   | 2005                               |
| Associate Technical Editor for EXPERIMENTAL MECHANICS                                   | 1999-2005                          |
| Engineering council award for excellence in advising                                    | 2005, 2010, 2011                   |
| List of UIUC teachers ranked as excellent   | Spring 02, 08, 09, 10; Fall 06, 10 |
| NSF early CAREER award  | 1999                               |

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## Honors and Awards (*cont.*)

Dean's commendation list for excellence in teaching	1996
William F. Ballhaus Prize (for most outstanding doctoral dissertation in Aeronautics)	1994
Ernest E. Sechler Memorial Award (for contributions to teaching and research in Aeronautics)	1993
Josephine de Karman Fellowship.	1993
Russell R. Vought and Donald W. Douglas Fellowships, Caltech.	1988
The Governor's Prize in Aeronautics (top ranking student in the final year, Imperial College)	1988
Holligrave Exhibition (Fellowship), Imperial College	1985

## Research Interests

Multi-length and time scale experimentation; Dynamic and quasi-static crack initiation, growth and arrest in multiphase systems; Dynamic fracture, failure and wave propagation in composite materials; Stress wave mitigation through microstructural tailoring; Dynamic constitutive response of traditional and advanced materials; Thermomechanical effects and adiabatic shear banding; High temperature thermomechanical fatigue of metals and ceramics; Failure and reliability of MEMS and thin films.

## Synergistic and Administrative Activities

- Prof. Lambros is the Principal Investigator and Director of the Army funded MURI for "Design of Adaptive Load Mitigating Materials Using Nonlinear Stress Wave Tailoring". This 5 year center effort, which started in 2009, involves the very close interaction of 6 faculty at UIUC and Caltech, 12 graduate students, and 4 postdoctoral researchers in a diverse and interdisciplinary research program.
- In July of 2008 Prof. Lambros was elected to a two year membership of the Executive Board of the Society for Experimental Mechanics. The board is the ultimate governing body of the society and has 15 members. Between 2008-2010, Prof. Lambros also served as the vice-Chair on the National Meetings Council which is responsible for organizing the society-wide annual summer meeting.
- Starting in 2006, Prof. Lambros has been serving on the steering committee of the Air Force funded Midwest Structural Sciences Center (MSSC). Since 2010 he has also assumed the duties of Technical Director of the center. This is an interdisciplinary collaborative center between researchers at UIUC and AFRL at Wright Patterson Air Force Base. The center involves about 30 senior researchers from UIUC and AFRL, and about 10 graduate students from UIUC. As Technical Director, Prof. Lambros is responsible for overseeing all center technical activities at UIUC.
- Prof. Lambros was co-director of the NASA funded Illinois Aerospace Institute (IAI) student summer camp from 2000 to 2007. This is a week long summer camp activity for high school students in grades 9 to 12 where students are exposed to the basics of aerospace engineering. His role in the IAI was to organize camp activities, recruit camp instructors and counselors, and structure the camp curriculum in the areas of materials, structures, fluids, propulsion, controls, orbits and design.
- For five years during his stay at the University of Delaware (1995-2000) Prof. Lambros was the faculty advisor for the UD student chapter of SAE (Society of Automotive Engineers). He supervised the team as they designed, built and tested a formula-1 type race car and then led the team three years in a row to the national competition held annually in Detroit, MI.
- Prof. Lambros has had extensive research collaboration with minority undergraduate and graduate students. He has supervised the research of seven female undergraduate students (Jennifer Buckley, Theresa Kidd, Ann Peedikayl, Lisa Mueller, Mary Murphy, Julia Stalder, Emily Zavala), one female graduate student (Mallory Casperson), and three minority Ph.D. students (Dr. Jorge Abanto-Bueno, who became an assistant professor of Mechanical Engineering at Bradley University, and Dr. Henry Padilla, who became a research scientist at Sandia National Laboratory) and Joseph Gonzalez, who is currently pursuing his M.S. degree.

## Teaching Experience

- 2000-present, UIUC: Undergraduate: AE321 Aerospace Structures I, AE322 Aerospace Structures II  
AE360 Structures Laboratory, AE 100SD Intro. to Aerospace Eng.  
AE491 Micro Air Vehicles, AE323 Applied Aerospace Structures
- Graduate: AE522 Dynamic Response of Materials  
ME532 Fracture Resistant Design  
AE560 Fracture Mechanics Laboratory  
AE521/CEE 575 Advanced Fracture Mechanics  
AE590 Graduate Seminar
- 1995-2000, UD: Undergraduate: MEEG 214 Principles of Mechanics II: Dynamics  
Graduate: MEEG 813 Theory of Elasticity, MEEG 825 Stress Waves  
MEEG 867 Advanced Fracture Mechanics  
MEEG 867 Advanced Elasticity
- 1989-1993: *Caltech* Graduate TA: Ae104 Experimental Methods, Ae225 Plasticity  
Ae102 Mechanics of Solids and Structures

## Presentations and Invited Colloquia

- 4/18/96, "Dynamic decohesion of bimaterial interfaces and composites", Mechanical Engineering, UC Berkeley, CA.
- 9/23/96, "Subsonic and intersonic decohesion of bimaterial interfaces", NIST, Gaithersburg, MD.
- 10/28/96, "Use of CGS interferometry in the study of dynamic delamination and fracture of reinforced polymeric matrix composites", Aeronautical and Astronautical Engineering, UIUC, Urbana, IL.
- 10/30/96, "Dynamic failure of bimaterials and composites", ARL, Aberdeen, MD.
- 3/5/98, "Fracture of anisotropic and inhomogeneous solids", Mechanical Engineering, U. of Pennsylvania, Philadelphia, PA.
- 4/2/98, "Fracture of inhomogeneous and anisotropic materials", Theoretical and Applied Mechanics, UIUC, Urbana, IL.
- 4/13/99, "Failure characterization of functionally graded materials", Mechanical Engineering, U. of Rhode Island, Kingston, RI.
- 4/26/99, "Fracture of polymers and polymeric based FGMs", Materials Science, Drexel, Philadelphia, PA.
- 9/27/99, "Transient thermomechanical behavior of polymers and polymeric matrix composites", Aeronautical and Astronautical Engineering, UIUC, Urbana, IL.
- 10/15/99, "Transient thermomechanical behavior of polymers and polymeric matrix composites", Mechanical Engineering SUNY, Stony Brook.
- 11/20/00, "Fracture of Functionally Graded materials", Aeronautics, Caltech, Pasadena, CA
- 3/14/02, "The mechanics of dynamic fiber push-out: Experimental and numerical study", ARL, Aberdeen, MD.
- 2/21/03, "Thermal dissipation of mechanical work during dynamic fracture of amorphous polymers", LLNL, Livermore, CA.
- 4/17/03, "Thermal dissipation of mechanical work during dynamic fracture of amorphous polymers", Mechanical Engineering, Michigan Technological University, Houghton, MI.
- 8/10/03, "Thermomechanical coupling in dynamic fracture of polymers", Theoretical and Applied Mechanics, Cornell Univ., Ithaca, NY.
- 4/23/04, "Dynamic response of LNG insulation systems: Experimental Analysis", American Bureau of Shipping, Houston, TX.
- 7/20/04, "Fracture of functionally graded materials: Experiments, simulations and analysis", Mechanical Engineering, Bogazici University, Istanbul, Turkey.
- 11/15/04, "Cohesive modeling of quasi-static fracture in functionally graded polymers", Aeronautics Caltech, Pasadena, CA
- 3/17/05, "Polyurethane foam dynamic damping", American Bureau of Shipping, Houston, TX.
- 8/17/05, "Dynamic failure of Materials and Thin Films", Workshop on Dynamic Failure of MEMS and Thin Films, Crystal City, Arlington VA.
- 8/18/05, "Dynamic failure of multilayer MEMS at high loading rates", Army Research Laboratory, Adelphi, MD.

## Invited Presentations (*cont.*)

- 6/8/06, "Digital image correlation for deformation measurements across multiple length scales", Dept. of Dermatology, University of Missouri, Columbia, MO.
- 12/7/06, "Dynamic failure of multilayer MEMS at high loading rates: Experiments and Simulations", Workshop on "Failure of MEMS", Army Research Laboratory, Adelphi, MD.
- 8/15/07, "(Thermo)mechanical rate dependent failure of MEMS: Current trends and future challenges", Workshop on "Fundamentals of Robust and Reliable Nano/MEMS Structures and Devices", Army Research Laboratory, Adelphi, MD.
- 9/10/07, "Fracture of FGMs using DIC", Civil and Environmental Engineering, UIUC, Urbana, IL
- 5/27/08, "Multi-scale experimental studies of material deformation and failure", Mechanical Engineering and Mechanics, Drexel University, PA
- 6/23/08, "Multi-scale experimental studies of material deformation and failure", Civil Engineering and Engineering Mechanics, Columbia University, NY
- 11/2/08, "Real time diagnostics for high speed thermomechanical and hydrodynamic processes", Computational Science and Engineering Workshop on Energetic Materials, UIUC
- 12/4/08, "Overview of dynamic failure mechanisms in MEMS devices and materials", Aeronautics and Astronautics Department, Purdue University
- 2/2/09, "Multiscale Study of Fatigue Crack Growth in Ti", Materials Science and Engineering, UIUC, Urbana, IL
- 1/15/10, "On the use of digital image correlation for the multiscale study of heterogeneous material response" Aeronautics and Applied Mechanics, Caltech, Pasadena, CA
- 2/2/10, "Applying digital image correlation to the multiscale study of heterogeneous material response", Mechanical and Aerospace Engineering, Univ. of Florida, Gainesville, FL
- 5/18/10, "Multiscale experimental studies of material deformation and failure", Aerospace Engineering, Georgia Tech, Atlanta, GA.
- 7/9/10, "Impact loading of one dimensional granular media: Experiments and Modeling", Midwest Workshop on Particulate Mechanics, Northwestern University, Evanston, IL.
- 3/21/11, "Multiscale investigation of thermomechanical fatigue using digital image correlation", Mechanical, Materials, and Aerospace Engineering, Illinois Institute of Technology, Chicago, IL.
- 5/2/11, "Multiscale study of the deformation and failure of metals and polymers", ARO/AFOSR Workshop on Multiscale Experimental Methods in Mechanics, Arlington, VA.
- 8/2/11, "Design of adaptive load mitigating materials using nonlinear stress wave tailoring", 2011 DoD MURI Conference, Arlington, VA.

## Professional Contributions

- Journal Editor: Associate Technical Editor "JOURNAL OF APPLIED MECHANICS", 2011-  
Associate Technical Editor "EXPERIMENTAL MECHANICS", 1999-2005
- Session chairman: ASME AMD-MD summer meeting, 1995  
ASME winter annual meeting, 1996, 1997, 1998, 2000, 2002, 2004, 2005, 2006  
13th US National Congress of Mechanics, 1998  
SEM summer annual meeting, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010
- Session (co)organizer: ASME winter annual meeting, 1996, Symposium on interfacial fracture mechanics (3 sessions)  
SEM summer annual meeting, 2000, Symposium on validation of computational models in fracture (2 sessions)  
ASME winter annual meeting, 2000, Symposium on fracture of functionally graded materials (2 sessions)  
SEM summer annual meeting, 2002, Symposium on fracture of multifunctional materials (1 session)

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**Professional Contributions (cont.)**

SEM summer annual meeting, 2003, Symposium on dynamic fracture of Interfaces, Graded and Layered materials (2 sessions)  
 SEM summer annual meeting, 2004, Symposium on Bridging length scales using numerics and experiments (2 sessions)  
 SEM summer annual meeting, 2004, Track 1: Damage mechanics, structural integrity and health monitoring, co-organizer.  
 ASME winter annual meeting, 2004, Symposium on High rate response of ductile materials (3 sessions)  
 ASME winter annual meeting, 2005, Symposium on Novel Experiments at the micro and nanoscale (3 sessions)  
 ASME winter annual meeting, 2006, Symposium on Dynamic failure of MEMS and thin films (1 session)  
 SEM summer annual meeting, 2008, Symposium on thermomechanical fatigue of metals and composites (2 sessions)  
 SES annual meeting, 2008, Symposium on thermomechanical fatigue of metals and composites (2 sessions)  
 SES annual meeting, 2008, Symposium on rate dependent failure of MEMS and thin films (2 sessions)  
 ASME winter annual meeting, 2010, Mini-Symposium on Mechanical Metamaterials and Stress-Wave Tailoring  
 AMD summer meeting, 2011, Symposium on Dynamic response of granular media

Workshop/Conference org.:

ARO sponsored workshop on “Dynamic failure of MEMS and thins films”, Crystal City, Arlington VA, August 17, 2005.  
 SES annual meeting, 2008, Technical Program Committee Member  
 SEM annual meeting, 2009, 2010, vice-Chair and track organizer

Committee memberships:

ASME Fracture Mechanics Technical Committee (1996-present, Secretary 2001-2003, Vice chair 2003-2005, Chair 2005-2007)  
 ASME Experimental Mechanics Technical Committee (1999-present, Secretary 2001-2003, Chair 2003-2005)  
 SEM Fatigue and Fracture Technical Committee (6/1999-present, Secretary 2002-2004, Vice chair 2004-2006, Chair 2006-2008)  
 SEM paper review committee (6/1999-6/2003, Chair 6/01-6/03)

Reviewer for:

Acta Materialia; American Institute of Aeronautics and Astronautics (AIAA) Journal; Applied Physics Letters; Composites Science and Technology; Composites Part B; Experimental Mechanics; Engineering Fracture Mechanics; Fatigue and Fracture of Engineering Materials and Structures; International Journal of Adhesion and Adhesives; International Journal of Fracture; International Journal of Nonlinear Mechanics; International Journal of Plasticity; International Journal of Solids and Structures; Journal of Applied Mechanics; Journal of Applied Physics; Journal of Composite Materials; Journal of Engineering Materials and Technology; Journal of Nonlinear Mechanics; Journal of Pressure Vessel Technology; Journal of Sandwich Structures and Materials; Journal of Strain Analysis for Engineering Design; Journal of the American Ceramic Society; Journal of the Mechanics and Physics of Solids; Journal of Thermoplastic Composite Materials; Metallurgical and Materials Transactions A; Mechanics of Materials; Mechanics Research Communications; Microporous and Mesoporous Materials; Modeling and Simulation in Materials Science and Engineering; Optical Engineering;

## Professional Contributions (*cont.*)

Philosophical Magazine; Physical Review B; Polymer Composites; Proceedings of the Royal Society of London; Strain.

<u>Book review:</u>	Boresi and Schmidt, Engineering Mechanics: Dynamics, PWS publishing, March 1998
<u>Proposal reviewer:</u>	NSF, ARI Instrumentation Proposal Review Panel, May 1996. AFOSR, Damage of Composite Materials, June 1998. NSF, Materials Engineering Review Panel, September 1999. NSF, Model Based Simulation Initiative Panel, June 2000. NSF, Cooperative Grants Program of the U.S. Civilian Research and Development Foundation, June 2001, 2002, 2003. NSF, Mechanics and Materials Panel, June 2002 AFOSR, Smart Materials and Structures, August 2003 NSF CAREER, CMS division, October 2006 NSF Nano/Bio Mechanics unsolicited panel, DMII, May 2008
<u>Board Membership:</u>	Member of Executive Board of the Society for Experimental Mechanics and member of National Meetings subcommittee, 2008-2010

## Administrative Duties at UD

Undergraduate Laboratory Committee '95-'96, '97-'98  
Undergraduate Recruitment Committee '95-'96  
Library Committee (Chair) '95-'96  
Graduate Curriculum Committee '96-'97  
Machine shop committee '96-'97  
Seminar committee '96-'97, '97-'98  
Graduate committee '97-'98  
Secretary to the Engineering Faculty '96-'97, '97-'98, '98-'99  
ABET committee '98-'99  
Nowinski symposium committee '98-'99  
Undergraduate Curriculum Assessment/ME200 Steering Committee '99-'00  
Undergraduate Curriculum Committee '99-'00  
College ABET committee '99-'00  
Faculty advisor to University of Delaware student chapter of Society of Automotive Engineers, '96-'00

## Administrative Duties at UIUC (**bold** denotes current appointments)

Engineering Open House Committee, '00-'01 (chair), '01-'02 (chair), '02-'03 (chair), '03-'04  
Graduate Admissions Committee, '00-'01, '01-'02, '02-'03, '03-'04, '06-'07, '09-'10 **'10-'11**  
Undergraduate Curriculum Committee '00-'01, '01-'02  
AE Head's advisory committee, '02-'03, '03-'04, '08-'09, '09-'10  
Qualifying Exam Committee, '02-'03, '03-'04 (Chair), '07-'08 (Chair), '08-'09, '09-'10  
AE department seminar organizer, Fall '02, '03, '09; Spring '03, '04  
Secretary to AAE faculty, '01-'02  
Chairman to AAE faculty, '02-'03  
College TEIS Committee '00-'01, '01-'02  
**Graduate Policy Committee**, '02-'03, '03-'04, '07-'08, '08-'09, '09-'10, **'10-'11**  
TA committee '04-'05, '05-'06, '08-'09  
Awards Committee, '07-'08, '08-'09  
Planning '07-'08  
**Faculty Search Committee (Mechanics search), '10-'11 (Chair)**  
**Faculty Search Committee (Combustion search), '10-'11 (Chair)**

## Administrative Duties at UIUC (cont.)

College Scholarship Committee '04-'05, '05-'06  
 College Research Policy and Planning committee '04-'05  
 College Placement committee '07-'08

### AFRL Midwest Structural Sciences Center Steering Committee '06-present

COE Executive committee subcommittee for CEE576 course review, Spring '08 (Chair)  
 COE Executive committee subcommittee for ME533 course review, Fall '08 (Chair)  
 COE Executive committee subcommittee for AE523 course review, Fall '08  
 COE Executive committee subcommittee for review of new AE curriculum, Fall '09

## Associations

Fellow, American Society of Mechanical Engineers (ASME)  
 Member, American Academy of Mechanics (AAM)  
 Member, Society of Experimental Mechanics (SEM)  
 Member, Society of Engineering Science (SES)  
 Member, Association of City and Guilds Institute (A.C.G.I.) of London  
 Lifetime Member, Athens College Alumni Association.

## Current Students

### Undergraduate:

Graduate students: Owen Kingstedt (Ph.D., expected 2013)  
 Mallory Casperson (Ph.D., expected, 2014)  
 Joseph Gonzalez (Ph.D., expected, 2014)  
 Tommy On (Ph.D., expected, 2014)  
 Robert Waymel (MS, expected, 2013)

Postdoctoral Fellows: Dr. Erheng Wang (2011-2013)

## Former Students

Undergraduate: Allan Starr (summer 1997), Jeremy Freeman (summer and winter 1997), George Sapna III (summer and winter 1997), Jennifer Buckley (winter 1998, REU, summer and winter 1999), Theresa Kidd (REU, summer 2001), Fady Hajjar (summer 2001), Glenn Hawkins (summer 2002), Andrew Oestreich (summer 2003), Jay Patel (summer 2002, 2003), Charles Prebil (summer 2003), Ann Peedikayl (REU, summer, fall 2003), Lisa Mueller (fall 2003), Benny Poon (UROP, summer, fall 2003, spring 2004), David Boddy (summer 2003), Brian Kuehn (UROP, summer, fall 2004), Jessica Senning (summer 2005), Dominic Menoni (spring 2006), Kevin Cerven (summer, fall 2006), Mary Murphy (UROP, summer 2007), Julia Stalder (REU, summer 2008), Joseph Gonzalez (spring 09, 10, UROP, summer 09, Fall 09), Emily Zavala (UROP, summer 10), Robert Waymel (UROP, summer 10).

### MS degrees:

- Hongwei Li, Jan. 1998, co-advised with Prof. Santare  
 Thesis: *Method for determining fracture parameters of functionally graded materials*  
 To: Philips Electronics of North America
- Rishikesh Bhalerao, Jul. 1998  
 Thesis: *Numerical and Experimental Characterization of Cellulose*  
 To: Hibbitt, Karlsson and Sorensen, Inc.
- Arvind Narayanaswamy, July 1999  
 Thesis: *Use of digital image correlation in the investigation of quasi-static fracture of FGMs*  
 To: Microstrategy Inc.
- Mohan Kompella, Feb. 2000  
 Thesis: *Micromechanical characterization of cellulose fibers*  
 To: Microstrategy Inc.

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## Former Students (cont.)

5. Dan Heisig, Oct. 2000  
Thesis: *Heat generated during dynamic elongation*  
To: Automation Inc.
6. Jamie Kimberley (in TAM), Feb. 2002  
Thesis: *Crack kinking from a dynamically loaded interface*  
To: UIUC, Ph.D.
7. Jay Patel, June 2005  
Thesis: *Digital image correlation for microscale and nanoscale deformation measurements*  
To: Northrop-Grumann
8. Stephen Paige (non-thesis), June 2005  
To: US Army Corp of Engineers
9. Robert Cooney, Sep. 2007  
Thesis: *Experimental characterization of MEMS failure under dynamic loading*  
To: Boeing Co.
10. Joel Krehbiel (in TAM), June 2008, co-advised with Prof. Sottos  
Thesis: *Digital image correlation for improved detection of basal cell carcinoma*  
To: UIUC, Ph.D.
11. Owen Kingstedt, May 2011  
Thesis: *A pulsed laser loading technique for controlled dynamic loading of nanostructured materials*  
To: UIUC, Ph.D.
12. Tommy On, July 2011  
Thesis: *Experimental study of the development of plastic solitary waves in 1D granular media*  
To: UIUC, Ph.D.
13. Joseph Gonzalez, December 2011  
Thesis: *Crack path selection in microstructurally tailored inhomogeneous polymers*  
To: UIUC, Ph.D.
14. Mallory Casperson, May 2012  
Thesis: *Investigation of thermal effects on fatigue crack closure using multiscale digital image correlation experiments*  
To: UIUC, Ph.D.
15. Bharath Swaminathan, May 2012  
Thesis: *Thermo-mechanical response and plastic deformation behavior of Hastelloy X at elevated Temperatures – role of dynamic strain aging*  
To: Applied Materials
16. Pater LaVigne (in MechSE), Jun2012  
Thesis: *Wave propagation in one dimensional confined granular media*

### Ph.D. degrees:

1. Zhouhua Li, March 2000  
Thesis: *Dynamic thermomechanical behavior of polymers and polymeric matrix composites*  
To: ABAQUS Solutions Inc.
2. Santosh Prabhu, October 2000  
Thesis: *Three-dimensional and K-dominance effects in isotropic and anisotropic cracked solids*  
To: Guidant Co.
3. Todd Bjerke, December 2001  
Thesis: *Thermal dissipation of mechanical work during opening and shear dominated dynamic fracture of amorphous polymers*  
To: Army Research Lab
4. Xiaopeng Bi, Sep. 2003, co-advised with Prof. Geubelle  
Thesis: *Dynamic fiber debonding and push-out in model composites*  
To: UC Riverside, CA, Postdoc



### Former Students (*cont.*)

5. Jorge Abanto-Bueno, May 2004  
Thesis: *Fracture of a model FGM manufactured from a photo-sensitive polyethylene*  
To: Bradley University, IL, Assistant Professor
6. Jamie Kimberley, Feb. 2008  
Thesis: *Failure of microelectromechanical systems under dynamic loading: An experimental and numerical investigation*  
To: Johns Hopkins University, MD, Postdoc
7. Henry Padilla III (Ph.D. in MechSE), Aug. 2008  
Thesis: *Multiscale experimental study on the effect of texture and anisotropy on the thermomechanical response of zirconium*  
To: Sandia National Lab, Research Scientist
8. Jay Carroll (Ph.D. in MechSE), May 2011  
Thesis: *Relating fatigue crack growth to microstructure via multiscale digital image correlation*  
To: Sandia National Lab, Research Scientist
9. Mark Gates (Ph.D. in CS), July 2011, co-advised with Prof. Heath  
Thesis: *High performance digital volume correlation*  
To: University of Tennessee, Postdoc

#### Postdoctoral Fellows:

Dr. Hermendra Arya (1997-1998)  
Dr. Zhongmin Wang (co-supervised with Prof. R. Lobo) (1999-2001)  
Dr. Dharendra V. Kubair (summer 2003)  
Dr. Jorge Abanto-Bueno (summer 2004)

## Research Funding

Key (current funding in **bold**):

ABS: American Bureau of Shipping

ARL: Army Research Laboratory

LLNL: Lawrence Livermore National Laboratory

ONR: Office of Naval Research

UIRB: University of Illinois Research Board

UIHSRC: University of Illinois Homeland Security Research Center

AFRL: Air Force Research Laboratory

ARO: Army Research Office

NSF: National Science Foundation

UDRF: UD Research Foundation

Year (Duration)	Title	Source	Amount	# PIs (Lead PI)
1996 (1 year)	Research Equipment: High speed infrared radiation detector system for use in thermographic measurements in dynamically deforming advanced materials	NSF	\$41,492	2 (Lambros)
1996 (1 year)	Strain rate effects on the fracture of fiber reinforced composite	UDRF	\$29,267	1
1996 (2 years)	Numerical and experimental modeling of a cellulose cutting process	Hercules Inc.	\$54,000	1
1997 (1 year)	Wave propagation in damaged and undamaged layered media	ARL	\$52,490	1
1997 (3 years)	Analytical and experimental study of crack-interface interactions in Continuously Nonhomogeneous Solids (CNM's)	NSF	\$238,944	2 (Lambros)
1997 (3 years)	Experimental and analytical investigation of dynamic fiber pull-out in composites	NSF	\$240,000	2 (Geubelle)
1997 (3 years)	High strain rate properties of advanced materials for use by the U.S. Navy.	ONR	\$175,940	2 (Vinson, UD)
1998 (1 year)	Fracture mechanics of Zeolites	Mobil/Grace	\$120,000	2 (Lobo, UD)
1998 (1 year)	Acquisition of a synchronous laser pulsing system for high speed camera applications	NSF	\$25,000	2 (Lambros)
1998 (1 year)	Numerical and experimental modeling of a cellulose cutting process (Continuation)	Hercules Inc.	\$63,954	1
1999 (4 years)	CAREER: Fundamental problems in dynamic fracture mechanics	NSF	\$200,000	1
1999 (1 year)	Thermomechanical coupling in the fracture of polymers and polymeric composites	UDRF	\$30,000	1
1999 (1 year)	REU for Analytical and experimental study of crack-interface interactions in Continuously Nonhomogeneous Solids (CNM's)	NSF	\$5,000	1
2000 (1 year)	Industrial collaboration supplement for NSF CAREER award	NSF	\$42,953	1
2001 (3 years)	Dynamic failure of Functionally Graded Materials: Experiments, Analysis and Simulations	NSF	\$330,000	3 (Paulino)

**Research Funding (cont.):**

<b>Year (Duration)</b>	<b>Title</b>	<b>Source</b>	<b>Amount</b>	<b># PIs (Lead PI)</b>
2002 (3 years)	Stockpile Stewardship Program: Determining the mechanical constitutive properties of metals as a function of strain rate and temperature: A combined experimental and modeling approach	DOE	\$885,574	3 (Robertson)
2002 (1 year)	REU for Fundamental problems in dynamic fracture mechanics	NSF	\$4,875	1
2003 (3 years)	US-Turkey cooperative research: Three dimensional effects in the fracture of functionally graded materials	NSF	\$33,950	1
2003 (1 year)	Dynamic response of LNG insulation system: Experimental analysis	ABS	\$45,057	1
2004 (1 year)	Dynamic failure of laminated glass	UIRB	\$11,213	1
2004 (1 year)	In situ strain measurements using nanoparticle tracers	UIRB	\$12,782	2 (Sottos)
2004 (1 year)	Dynamic thermomechanical coupling in ductile metals	LLNL	\$30,000	1
2005 (3 years)	Mechanical response and failure of MEMS devices under dynamic loading	ARO	\$280,000	2 (Lambros)
2005 (1 year)	Workshop on the dynamic failure of MEMS materials and devices	ARO	\$15,000	2 (Lambros)
2005 (1 year)	Acquisition of high-speed camera for study of small length scale failure phenomena	ARO	\$25,000	1
2005 (3 years)	An experimental/numerical study of metals and nanostructured metallic multi-layers	DOE	\$825,000	3 (Robertson)
2005 (1 year)	High-speed camera for study of small length scale failure phenomena	UIRB	\$20,127	1
<b>2006 (7 years)</b>	<b>Midwest structural sciences center</b>	<b>AFRL</b>	<b>\$3,500,000</b>	<b>9 (Dick)</b>
2006 (4 years)	Rate effects on the material and interfacial failure of thin films: From static to dynamic loading.	NSF	\$280,000	2 (Lambros)
2006 (1 year)	Thermal camera for study of MEMS device failure.	ARO	\$50,000	2 (Lambros)
2006 (1 year)	Secondary building collapse detection using digital image correlation	UIHSRC	\$30,000	1
2007 (1 year)	Acquisition of an ultra high speed camera for CSAR validation studies.	UIRB	\$20,000	4 (Austin)
2007 (1 year)	DURIP: Ultra-high-speed digital camera for small scale dynamic metrology.	ARO	\$150,000	1
2008 (1 year)	Skin lesion detection using digital image correlation	UIRB	\$5,000	2 (Lambros)
2008 (1 year)	DURIP: Laser vibrometer to study the dynamic response of Microelectromechanical systems	ARO	\$70,000	1

**Research Funding (cont.):**

<b>Year (Duration)</b>	<b>Title</b>	<b>Source</b>	<b>Amount</b>	<b># PIs (Lead PI)</b>
2009 (1 year)	Digital volume correlation using microcomputed tomography	UIRB	\$4,000	2 (Lambros)
2009 (3 years)	Dynamic response of nanostructured single and multilayered metals	DOE	\$675,000	3 (Robertson)
2009 (5 years)	MURI: Design of Adaptive Load Mitigating Materials Using Nonlinear Stress Wave Tailoring	ARO	\$6,250,000	6 (Lambros)
2011 (1 year)	DURIP: Experimental validation in extreme thermoacoustic environments	AFOSR	\$389,985	2 (Patterson, MSU)
2011 (3 years)	GSRP: Multiscale thermomechanical fatigue analysis (Mallory Casperson)	NASA	\$30,000	1

**Instructional Funding:**

Key:

COE: College of Engineering

UI ETB: University of Illinois Educational Technologies Board

<b>Year (Duration)</b>	<b>Title</b>	<b>Source</b>	<b>Amount</b>	<b># PIs (Lead PI)</b>
2000 (1 year)	Information technology to redesign the structural mechanics part of the AAE undergraduate Curriculum	UI ETB	\$29,962	5 (Geubelle)
2006 (1 year)	Revision of AE360 Lab	COE	\$58,000	2 (Chasiotis)

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## Book Chapters

1. Lambros J., "Dynamic Response of Materials", in Encyclopedia of Aerospace Engineering, Wiley-Blackwell, 2010

## Refereed Journal Publications

1. Mason J. J., Lambros J. and Rosakis A. J., "The use of a coherent gradient sensor in dynamic mixed-mode fracture mechanics experiments", *Journal of the Mechanics and Physics of Solids*, Vol. 40, No. 3, pp. 641-661, 1992.

2. Liu C., Lambros J. and Rosakis A. J., "Highly transient crack growth in a bimaterial interface : Higher order asymptotic analysis and optical experiments", *Journal of the Mechanics and Physics of Solids*, Vol. 41, No. 12, pp. 1887-1954, 1993.

3. Lambros J. and Rosakis A. J., "Dynamic decohesion of bimaterials : Experimental observations and failure criteria", *International Journal of Solids and Structures* , Vol. 32, No. 17/18, pp. 2677-2702, 1995.

4. Lambros J. and Rosakis A. J., "Shear dominated transonic crack growth in bimaterials-Part I: Experimental observations", *Journal of the Mechanics and Physics of Solids*, Vol. 43, No. 2, pp. 169-188, 1995.

5. Lambros J. and Rosakis A. J., "Development of a dynamic decohesion criterion for subsonic fracture of the interface between two dissimilar materials", *Proceedings of the Royal Society of London, Series A*, Vol. 451, pp. 711-736, 1995.

6. Lee Y. J., Lambros J. and Rosakis A. J., "Analysis of coherent gradient sensing (CGS) by Fourier optics", *Optics and Lasers in Engineering*, Vol. 25, No. 1, pp. 25-53, 1996.

7. Lambros J. and Rosakis A. J., "Dynamic crack initiation and growth in thick unidirectional graphite/epoxy plates", *Composites Science and Technology*, Vol. 57, No. 1, pp. 55-65, 1997.

8. Lambros J. and Rosakis A. J., "An experimental study of the dynamic delamination of thick fiber reinforced polymeric matrix composite laminates", *Experimental Mechanics*, Vol. 37, No. 3, pp. 360-366, 1997.

9. Singh R., Lambros J., Shukla A. and Rosakis A. J. "Two optical techniques applied to the investigation of the mechanics of intersonic crack propagation along a bimaterial interface", *Proceedings of the Royal Society of London, Series A*, Vol. 453, pp. 2649-2667, 1997.

10. Li Z. and Lambros J., "Determination of the dynamic response of polymeric matrix composites using the Split Hopkinson Pressure Bar", *Composites Science and Technology*, Vol. 59, No. 7, pp. 1097-1107, 1999.

11. Lambros J., Santare M. H., Li H. and Sapna G. III, "A novel technique for the fabrication of laboratory scale Functionally Graded Materials", *Experimental Mechanics*, Vol. 39, No. 3, pp. 183-189, 1999.

12. Lambros J., Narayanaswamy A., Santare M. H. and Anlas G., "Manufacture and testing of a model functionally graded material", *Journal of Engineering Materials and Technology*, Vol. 121, No. 4, pp. 488-493, 1999.

13. Li H., Lambros J., Cheeseman B. A. and Santare M. H., "Experimental investigation of the quasi-static fracture of functionally graded materials", *International Journal of Solids and Structures*, Vol. 37, No. 27, pp. 3715-3732, 2000.

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**Refereed Journal Publications (cont.):**

14. Prabhu S. and Lambros J., "A numerical investigation of three dimensional effects in cracked unidirectional fiber reinforced composite plates", *Journal of Composite Materials*, Vol. 34, No. 2, pp. 116-134, 2000.
15. Li Z. and Lambros J., "Thermomechanical dynamic behavior of fiber reinforced composites", *Composites A*, Vol. 31, pp. 537-547, 2000.
16. Prabhu S. and Lambros J., "Effect of mode mixity on K-dominance and three dimensionality in cracked plates", *International Journal of Fracture*, Vol. 104, No. 1, pp. 51-69, 2000.
17. Anlas G., Santare M. H. and J. Lambros, "Numerical calculation of stress intensity factors in functionally graded materials", *International Journal of Fracture*, Vol. 104, No. 2, pp. 131-143, 2000.
18. Santare M. H. and Lambros J., "Use of a graded finite element to model the behavior of nonhomogeneous materials", *Journal of Applied Mechanics*, Vol. 67, No. 4, pp. 819-822, 2000.
19. Prabhu S. and Lambros J., "A Combination Optical Method of Lateral Shearing Interferometer and Caustics", *Experimental Mechanics*, Vol. 40, No. 4, pp. 376-383, 2000.
20. Li Z. and Lambros J., "Strain rate effects on the Thermomechanical Behavior of Polymers", *International Journal of Solids and Structures*, Vol. 38, No. 20, pp. 3549-3562, 2001.
21. Bjerke T., Li Z. and Lambros J., "Role of plasticity in heat generation during high rate deformation and fracture of Polycarbonate", *International Journal of Plasticity*, Vol. 18, No. 4, pp. 549-567, 2002.
22. Bjerke T. and Lambros J., "Heating during shearing and opening dominated dynamic fracture of polymers", *Experimental Mechanics*, Vol. 42, No. 1, pp. 107-114, 2002.
23. Abanto-Bueno J. and Lambros J., "Experimental evaluation of fracture parameters in Functionally Graded Materials using a Digital Image Correlation technique", *Engineering Fracture Mechanics*, Vol. 69, pp. 1695-1711, 2002.
24. Kompella M. and Lambros J., "Micromechanical characterization of cellulose fibers", *Polymer Testing*, Vol. 21, pp. 523-530, 2002.
25. Wang Z., Lambros J. and Lobo R. F., "Micromechanical compressive response of a zeolite single crystal", *Journal of Materials Science*, Vol. 37, No. 12, pp. 2491-2499, 2002.
26. Anlas G., Lambros J. and Santare M.H., "Dominance of asymptotic crack tip fields in elastic functionally graded materials", *International Journal of Fracture*, Vol. 115, pp. 193-204, 2002.
27. Li Z., Bi X., Lambros J. and Geubelle P. H., "Dynamic fiber debonding and frictional push-out in model composite systems: experimental observations", *Experimental Mechanics*, Vol. 42, No. 4, pp. 417-425, 2002.
28. Bi X., Li Z., Geubelle P. H. and Lambros J., "Dynamic fiber debonding and frictional push-out in model composite systems: numerical simulations", *Mechanics of Materials*, Vol. 34, No. 7, pp. 433-446, 2002.
29. Prabhu S. and Lambros J., "Mixed mode asymptotic crack tip fields in orthotropic materials: Derivation and range of dominance", *International Journal of Fracture*, Vol. 118, No. 4, pp. 339-361, 2002.
30. Wang Z., Lobo R. F. and Lambros J., "The mechanical properties siliceous ZSM-5 (MFI) crystals", *Microporous and Mesoporous Materials*, Vol. 57, pp. 1-7, 2003.

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31. Bjerke T. and Lambros J., "Theoretical development and experimental validation of a thermally dissipative cohesive zone model for dynamic fracture of amorphous polymers", *Journal of the Mechanics and Physics of Solids*, Vol. 51, pp. 1147-1170, 2003.
32. Kimberley J. and Lambros J., "Dynamic crack kinking from a PMMA/Homalite interface", *Experimental Mechanics*, Vol. 44, No. 2, pp. 158-166 2004.
33. Abanto-Bueno J. and Lambros J., "Mechanical and fracture behavior of an artificially UV-irradiated polyethylene carbon monoxide copolymer", *Journal of Applied Polymer Science*, Vol. 92, pp. 139-148, 2004.
34. Abanto-Bueno J. and Lambros J., "Experimental Determination of Cohesive Failure Properties of a Photodegradable Copolymer", *Experimental Mechanics*, Vol. 45, No. 2, pp. 144-152, 2005.
35. Kandula S.S.V., Abanto-Bueno J., Geubelle P.H. and Lambros J., "Cohesive modeling of dynamic fracture in functionally graded materials", *International Journal of Fracture*, Vol. 132, No. 3, pp. 275-296, 2005.
36. Kubair D., Geubelle P.H. and Lambros J., "Asymptotic analysis of a mode 3 stationary crack in a ductile functionally graded material", *Journal of Applied Mechanics*, Vol. 72, No. 4, pp. 461-467, 2005.
37. Abanto-Bueno J. and Lambros J., "Parameters controlling fracture resistance in functionally graded materials under mode I loading", *International Journal of Solids and Structures*, Vol. 43, No. 13, pp 3920-3939, 2006.
38. Kandula S.S.V., Abanto-Bueno J., Geubelle P.H. and Lambros J., "Cohesive modeling of quasi-static fracture in functionally graded materials", *Journal of Applied Mechanics*, Vol. 73, No. 5, pp. 783-791, 2006.
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40. Berfield T.A., Patel J.K., Shimmin R.G., Braun P.V., Sottos N.R. and Lambros J., "Fluorescent Image Correlation for Nanoscale Deformation Measurements", *Small*, Vol. 2, No. 5, pp. 631-635, 2006.
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42. Padilla H., Smith C., Lambros J., Beaudoin A. and Robertson I., "Effects of deformation twinning on energy dissipation in high rate deformed zirconium", *Metallurgical and Materials Transactions A*, Vol. 38, No. 12, pp. 2916-2927, 2007.
43. Kimberley J., Lambros J. and Chasiotis I., "Failure of Microelectromechanical Systems subjected to impulse loads", *International Journal of Solids and Structures*, Vol. 45, No. 2, pp. 497-512, 2008.
44. Oral A., Lambros J. and Anlas G., "Crack Initiation in Functionally Graded Materials under Mixed Mode Loading: Experiments and Simulations", *Journal of Applied Mechanics*, Vol. 75, No. 5, pp. 051110-8, 2008.
45. Efstathiou C., Sehitoglu H., Carroll J., Lambros J. and Maier H.J., "Full-Field Strain Evolution during Intermartensitic Transformations in Single Crystal NiFeGa", *Acta Materialia*, Vol. 56, pp. 3791-3799, 2008.

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46. Kimberley J., Lambros J., Chasiotis I., J. Pulskamp, R. Polcawich, M. Dubey, "A hybrid experimental/numerical investigation of the response of multilayered MEMS devices to dynamic loading", *Experimental Mechanics*, DOI: 10.1007/s11340-009-9259-0, 2009.
47. Kimberley J., Cooney R.S., Lambros J., Chasiotis I. and Barker N.S., "Failure of Au RF-MEMS Switches Subjected to Dynamic Loading", *Sensors and Actuators A: Physical*, Vol. 154, No. 1, pp. 140–148, 2009.
48. Carroll J., Efstathiou C., Lambros J., Sehitoglu H., Hauber B., Spotswood S. and Chona R., "Investigation of Fatigue Crack Closure Using Multiscale Image Correlation Experiments", *Engineering Fracture Mechanics*, Vo. 76, No. 15, pp: 2384-2398, DOI: 10.1016/j.engfracmech.2009.08.002, 2009.
49. Jonnalagadda K.N., Chasiotis I., Yagnamurthy S., Lambros J., Pulskamp J., Polcawich R., Dubey M., "Experimental Investigation of Strain Rate Dependence in Nanocrystalline Pt Films", *Experimental Mechanics*, Special issue on Nanotechnology, DOI 10.1007/s11340-008-9212-7, 2010. (2012 SEM Hetényi Award winner).
50. Efstathiou C., Sehitoglu H. and Lambros J., "Multiscale Strain Measurements of Plastically Deforming Polycrystalline Titanium: Role of Deformation Heterogeneities", *International Journal of Plasticity*, Vol. 26, pp. 93–106, 2010.
51. Krehbiel, J., Lambros, J., Viator, J. and Sottos, N.R., Digital image correlation for improved detection of basal cell carcinoma, *Experimental Mechanics*, Vol. 50, No. 6, pp. 813-824, DOI: 10.1007/s11340-009-9324-8, 2010.
52. Kimberley J., Lambros J., Chasiotis I., Pulskamp J., Polcawich R. and Dubey M., "Mechanics of energy transfer and failure of ductile microscale beams subjected to dynamic loading", *Journal of the Mechanics and Physics of Solids*, Vol. 58, pp. 1125-1138, DOI:10.1016/j.jmps.2010.04.005, 2010.
53. Carroll J., Abuzaid W., Lambros J. and Sehitoglu H., "An experimental methodology to relate local strain to microstructural texture", *Review of Scientific Instruments*, Vol. 81, 083703, 2010.
54. Oral A., Lambros J. and Anlas G., "Determination of Gurson-Tvergaard-Needleman Model Parameters for Failure of a Polymeric Material", *International Journal of Damage Mechanics*, DOI: 10.1177/1056789510385261, 2010.
55. Padilla H., Lambros J., Beaudoin A. and Robertson I., "Spatiotemporal thermal inhomogeneities during adiabatic compression of highly textured zirconium", *Experimental Mechanics*, Vol. 51, pp. 1061–1073, DOI 10.1007/s11340-010-9425-4, 2010.
56. Gates M., Lambros J. and Heath M.T., "Towards High Performance Digital Volume Correlation", *Experimental Mechanics*, Vol. 51, No. 4, pp. 491-507, (Special Issue on Advanced Imaging Techniques), 2011. DOI: 10.1007/s11340-010-9445-0
57. Gain A.L., Carroll J., Paulino G.H. and Lambros J., "A hybrid experimental/numerical technique to extract cohesive fracture properties for mode-I fracture of quasi-brittle materials", *International Journal of Fracture*, Vol. 169, No. 2, pp. 113-133, DOI: 10.1007/s10704-010-9578-2, 2011.
58. Lambros J. and Patel J.K., "Microscale Digital Image Correlation Study of Irradiation Induced Ductile-To-Brittle Transition in Polyethylene", in press, *Journal of Strain Analysis for Engineering Design*, (Special issue on Micro-scale experimental mechanics), 2011.



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59. Yagnamurthy S., Chasiotis I., Lambros J., Polcawich R.G., Pulskamp J.S. and Dubey M., "Mechanical and Ferroelectric Behavior of PZT-based Thin Films", in press, *Journal of Microelectromechanical Systems*, 2011.
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61. Abuzaid W., Sangid M.D., Carroll J.D., Sehitoglu H. and Lambros J., "Slip transfer and plastic strain accumulation across grain boundaries in HastelloyX", in press *Journal of the Mechanics and Physics of Solids*, 2012
62. Karanjgaokar N.J., Oh C.S., Lambros J. and Chasiotis I., "Inelastic Deformation of Nanocrystalline Au Thin Films as a Function of Temperature and Strain Rate", in press *Acta Materialia*, 2012
63. Wang E., Geubelle P.H. and Lambros, "An Experimental Study of the Dynamic Elasto-Plastic Contact Behavior of Metallic Granules", in press *Journal of Applied Mechanics*, 2012.
64. Carroll J.D., Abuzaid W., Lambros J. and Sehitoglu H., "High resolution digital image correlation measurements of strain accumulation in fatigue crack growth", in press *International Journal of Fatigue*, 2012