

**COLLEGE OF ENGINEERING BIOGRAPHICAL DATA**  
**UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN**

Department(% appointment): Aerospace Engineering (100%), Theoretical and Applied Mech. (0%), Mechanical and Industrial Engineering (0%), Beckman Institute (0%)

Date: January 2, 2006

1. Name: Geubelle Philippe H. Date of Birth: August 19, 1964  
(last) (first) (m.i.)  
Citizenship: USA

2. Present Academic Rank: Associate Professor 3. Tenure Status (as listed in the budget) Tenured

4. Administrative Title (if any now held) Director of Illinois NASA Space Grant Consortium

**List the following information, starting with the most recent date.** (attach additional pages as needed)

5. Degrees (field, institution, year awarded)

Ph.D.	Aeronautics, California Institute of Technology	1993
M.S.	Aeronautics, California Institute of Technology	1989
B.S.	Mech. Engr., Catholic University of Louvain (LLN, Belgium)	1988

6. Academic Positions at U of I and elsewhere (rank, institution, inclusive dates)

Part-time Faculty Associate, Advanced Chemical Systems Group, Beckman Institute	2004-present
Visiting Professor, Catholic University of Louvain, Belgium	2002
Associate Professor (100%), AE, UIUC	2000-present
MIE Faculty Associate (0%), UIUC	2001-present
TAM Faculty Fellow (0%), UIUC	1998-present
Assistant Professor (100%), AE, UIUC	1995-2000
N.A.T.O. Postdoctoral Research Associate, Harvard University	1993-1994

7. a. Other Professional Employment (title, organization, location, inclusive dates)

Graduate Research Assistant, California Institute of Technology	1989-1993
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b. Major Consulting Activities (past five years) (list organization and location)

American Bureau of Shipping, Houston, TX (2003-2005)  
Short Graduate Course on Fracture Mechanics, UCL, Belgium (November 2002)  
AdTech Systems, Dayton, OH (2001-2002)  
Short Course on Fracture Mechanics, ARL, Aberdeen, MD (March 2001)

c. Professional Registrations (filed, location, date)

8. Honors, Recognition and Outstanding Achievements (since PhD)

a. Teaching

Accenture Excellence in Advising Award, University of Illinois College of Engineering Everitt, 2005  
"Incomplete List of Teachers Rated as Excellent by Their Students," 1995, 1996, 1997, 1999, 2000, 2001, 2002, 2005.

University of Illinois College of Engineering Everitt Teaching Award, 2000  
AIAA Teacher of the Year Award, UIUC, 1998

b. Research

Bliss Faculty Scholar, College of Engineering, UIUC, 2005-2008

American Society for Composites Best Paper Award, 16<sup>th</sup> Technical Conference, Polymer Matrix Composite Division, 2001

University of Illinois College of Engineering Xerox Research Award, 1999

NSF Career Award, 1998

N.A.T.O. Postdoctoral Fellowship, 1994

c. Public Service

## FACTUAL INFORMATION

### A. Resident Instruction and Continuing Education

1. Resident Instruction (see attached Teaching Activity Report)

2. Continuing Education (credit courses only)

<u>Year</u>	<u>Course</u>	<u># of Students</u>	<u>Delivery Method</u>
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3. Other Instructional Activities

Ph.D. Preliminary Exams:

J. Berman (AAE)	1996
Q. Zhu (AAE)	1999
J. Wang (TAM)	2000
M. Kessler (TAM)	2000
S. Maiti (AAE)	2000
D. Kubair (AAE)	2000
M. Li (MIE)	2000
D. O'Brien (MIE)	2001
E. Brown (TAM)	2001
J. Liu (ECE)	2001
X. Ma (CS)	2002
J. Lee (CS)	2002
R. Jaiman (AE)	2004
K. Nakshatrala	2004
G. Koenig (CS)	2004
J. Kimberly (AE)	2004
K. Toohey (TAM)	2005

Ph.D. Final Exams:

Y. Kim (AAE)	1997
A. Gollarud (CEE)	1999
J. Berman (AAE)	2000
Q. Zhu (AAE)	2000
D. Kubair (AAE)	2001
M. Kessler (TAM)	2002
J. Liu (ECE)	2002
S. Maiti (AAE)	2002
J. Lee (CS)	2003
X. Bi (AE)	2003
D. Therriault (AE)	2003
E. Brown (TAM)	2003
X. Ma (CS)	2003
Q. Li (CS)	2004
J. P. Petti (CEE)	2004
J. Lin (AE)	2004
J. Armando-Bueno (AE)	2004

## Course development:

Introduced in 2004 the NASA-supported Undergraduate Research Opportunity Program (UROP) in Aerospace Engineering and Science involving 15 to 20 undergraduate students who take part in intensive research activities in aerospace engineering and science during summer.

New course – AE 199 SD: Applied Spacecraft Design (Freshmen Design Course) – First taught in Fall 2004 to 60 AE freshmen organized in 10 teams. Each team is asked to design, build and fly a model rocket with a variety of sensors (camera, altimeter, pressure sensor, accelerometers). Emphasis is also placed on data analysis, programming, report writing and engineering ethics.

New course – AE 598 FM (formerly AAE 493 FM): Advanced Fracture Mechanics – Now cross-listed with MIE and CEE.

New course – AE 470 (formerly AAE 270): Computational Methods in Aerospace Engineering – Now a required senior-level course of AE undergraduate curriculum. Strong emphasis on programming (in Matlab).

Updating of AE 321 (formerly AAE 221): Aerospace Structures II.

Major redesign of AE 420 (formerly AAE 320): Introduction to the Finite Element Method (FEM) – Crosslisted with ME 471 – Strong emphasis on programming (with Matlab) and on theory of FEM. Introduction to commercial FE packages.

New discovery course – AE 199: Introduction to Solid Propellant Rockets

## 4. Undergraduate Advising, current year only

a) academic advising 15-20 students

b) student organizations

c) design teams

Structural design consultant for the Floating Illini, 2000

Structural design consultant for the Floating Illini, 2001

d) other:

Undergraduate Research Advising:

P. Lee (AAE)	1997-1998
M. Zaczek (AAE)	1998
D. Perveiler (AAE)	2000
C. Navarro (AAE)	2001
W. Harris (AAE)	2001-2002
J. Kowtko (AAE)	2001, 2002
M. Anderson (AAE)	2003
W. Bauer (AAE)	2003-2004
Y. Chew (AE)	2004
J. Gu (CS)	2004-2005
R. Page (AE)	2005
B. Collins (MIE)	2005
D. Ofman (ECE)	2005
S. Stetak (CS)	2005

**B. Research, Creative, and Other Scholarly Activities**

- List publications in print or accepted, with authors' names ordered the way they appear on publications. Provide inclusive page numbers for papers in proceedings and journals. Follow the outline given below for the organization of the list of publications. Within each category place items in chronological order. Place a single asterisk(\*) before any publication which has undergone stringent editorial review by peers. Place a double asterisk(\*\*) before any publication which was invited and carries with it prestige and recognition. Place an s before any publication based on your work as a student. Indicate by ! up to 5 publications that you consider to represent your most important contributions of the past decade.

a<sub>1</sub>. Books Authored or Co-Authored, Original Editions

None

a<sub>2</sub>. Books Authored or Co-Authored, Revisions

None

b<sub>1</sub>. Books Edited or Co-Edited, Original Editions

None

b<sub>2</sub>. Books Edited or Co-Edited, Revisions

None

c. Chapters in Books

None

d. Monographs (longer than an article but shorter than a book)

None

e<sub>1</sub>. Articles in Journals

- 1) \*s Geubelle, P. H. and Knauss, W. G. (1994) "Crack propagation at and near bimaterial interfaces : linear analysis". *ASME J. Appl. Mech.*, **61**, 560-566.
- 2) \*s Geubelle, P. H. and Knauss, W. G. (1995) "Crack propagation at and near bimaterial interfaces under general loading : nonlinear analysis". *ASME J. Appl. Mech.*, **62:3**, 601-606.
- 3) \*s Geubelle, P. H. and Knauss, W. G. (1994) "Finite strains at the tip of a crack in a sheet of hyperelastic material: 1. Homogeneous case". *J. Elasticity*, **35**, 31-98.
- 4) \*s Geubelle, P. H. and Knauss, W. G. (1994) "Finite strains at the tip of a crack in a sheet of hyperelastic material: 2. Special bimaterial cases". *J. Elasticity*, **35**, 99-137.
- 5) \*s Geubelle, P. H. and Knauss, W. G. (1994) "Finite strains at the tip of a crack in a sheet of hyperelastic material: 3. General bimaterial case". *J. Elasticity*, **35**, 139-174.
- 6) \*s Geubelle, P. H. and Knauss, W. G. (1995) "A note related to energy-release rate computations for kinking interface cracks". *ASME J. Appl. Mech.*, **62:1**, 266-267.
- 7) \*s Geubelle, P. H. (1995) "Finite deformation effects in homogeneous and interfacial fracture". *Int. J. Solids Structures*, **36:6/7**, 1003-1016.
- 8) \*! Geubelle, P. H. and Rice, J. R. (1995) "A spectral method for 3D elastodynamic fracture problems". *J. Mech. Phys. Solids*, **43:11**, 1791-1824.
- 9) \* Morrissey, J. W. and Geubelle, P. H. (1997) "A numerical scheme for mode III dynamic fracture problems". *Int. J. Numer. Meth. Eng.*, **40**, 1181-1196.
- 10) \* Geubelle, P. H., Danyluk, M. J. and Hilton, H. H. (1997) "Dynamic mode III fracture in viscoelastic media". *Int. J. Solids Structures*, **35**, 761-782.
- 11) \* Geubelle, P. H. and Breitenfeld, M. S. (1997) "Numerical analysis of dynamic debonding under anti-plane shear loading". *Int. J. Fracture*, **85**, 265-282.

- 12) \* Danyluk, M. J., Geubelle, P. H. and Hilton, H. H. (1998) "2D and 3D dynamic fracture in viscoelastic media". *Int. J. Solids Structures*, **35:28-29**, 3831-3853.
- 13) \* Geubelle, P. H. (1997) "A numerical method for elastic and viscoelastic dynamic fracture problems in homogeneous and bimaterial systems". *Computational Mechanics*, **20:1-2**, 20-25.
- 14) \*! Breitenfeld, M. S. and Geubelle, P. H. (1998) "Numerical analysis of dynamic debonding under 2D in-plane and 3D loading". *Int. J. Fracture*, **93**, 13-38.
- 15) \* Geubelle, P. H. and Baylor, J. (1998) "Impact-induced delamination of composites: a 2D simulation". *Composites B*, **29B**, 589-602.
- 16) \* Breitenfeld, M. S. and Geubelle, P. H. (2000) "Parallel implementation of a spectral scheme for the simulation of 3D dynamic fracture events". *Int. J. High Performance Computing Appl.*, **14:1**, 26-38.
- 17) \* Lin, G., Geubelle, P. H. and Sottos, N. R. (2001) "Simulation of fiber debonding with friction in a model composite pushout test". *Int. J. Solids Structures*, **38:46-47**, 8547-8562.
- 18) \* Geubelle, P. H. and Kubair, D. (2001) "Intersonic crack propagation in homogeneous media under shear-dominated loading: Numerical analysis". *J. Mech. Physics Solids*, **49:3**, 571-587.
- 19) \* Zhu Q., Li M., Geubelle, P.H. and Tucker, C. L. (2001) "Dimensional accuracy of thermoset composites: simulation of process-induced residual stresses". *J. Composite Materials*, **35:24**, 2171-2205.
- 20) \* Li, M., Zhu, Q., Geubelle, P. H. and Tucker, C. L. (2001) "Optimal curing for thermoset matrix composites: thermomechanical considerations". *Polymer Composites*, **22**, 118-131.
- 21) \* Zhu Q. and Geubelle, P.H. (2002) "Dimensional accuracy of thermoset composites: shape optimization". *J. Composite Materials*, **36:6**, 647-672.
- 22) \* Wood, B., Loth, E. and Geubelle, P. H. (2002) "A numerical methodology for an aeroelastic supersonic viscous flow". *J. Fluid and Structures*, **16:8**, 1127-1144.
- 23) \*! White, S. R., Sottos, N. R., Geubelle, P. H., Moore, J. S., Kessler, M. R., Sriram, S. R., Brown, E. N. and Viswanathan, S. (2001) "Autonomic healing of polymer composites". *Nature*, **409**, 794-797.
- 24) \* Hwang, C. and Geubelle, P. (2000) "A spectral scheme to simulate dynamic fracture problems in composites". *Computer Modeling in Eng. & Science*, **1:4**, 45-56.
- 25) \* Li Z., Bi X., Lambros J. and Geubelle P. H. (2002) "Dynamic fiber debonding and frictional push-out in model composite systems: experimental observations". *Experimental Mechanics*, **42:4**, 417-425.
- 26) \*! Kubair, D., Geubelle, P. H. and Huang, Y. (2002) "Intersonic crack propagation in homogeneous media under shear-dominated loading: Theoretical analysis". *J. Mech. Phys. Solids*, **50:8**, 1547-1564.
- 27) \* Kubair, D., Geubelle, P. H. and Huang, Y. (2003) "Analysis of a rate-dependent cohesive model for dynamic crack propagation". *Eng. Fracture Mech.*, **50:5**, 685-704.
- 28) \* Bi, X., Li, Z., Geubelle, P. H. and Lambros, J. (2002) "Dynamic fiber debonding and frictional push-out in model composite systems: numerical simulations". *Mechanics of Materials*, **34**, 433-446.
- 29) \* Zhu, Q., Shrotriya, P., Sottos, N. R. and Geubelle, P. H. (2003) "Three-dimensional simulation of viscoelastic response of a woven composite substrate for multilayer PCB". *Composite Science and Technology*, **63**, 1971-1983.
- 30) \* Zhang, P., Huang, Y., Geubelle, P. H., Klein, P. A. and Hwang, K. C. (2002) "The elastic modulus of single-wall carbon nanotubes: a continuum analysis incorporating interatomic potentials". *Int. J. Solids Structures*, **39**, 3893-3906.

- 31) \* Zhang P., Huang Y., Geubelle P. H., and Hwang K. C. (2002) "On the continuum modeling of carbon nanotubes". *Acta Mechanica Sinica*, **18:5**, 528-536.
- 32) \* Kubair, D. and Geubelle, P. H. (2003) "Comparative analysis of extrinsic and intrinsic cohesive models of dynamic fracture". *Int. J. Solids Structures*, **40:15**
- 33) \* Maiti, S. and Geubelle, P. H. (2002) "Mesoscale modeling of dynamic fracture of ceramic materials". *Computer Modeling in Eng. & Science*, **5:2**, 91-101.
- 34) \* Jiang, H., Zhang, P., Liu, B., Huang, Y., Geubelle, P. H., Gao, H. and Hwang, K. C. (2002) "The effect of nanotube radius on the constitutive model for carbon nanotubes". *Computational Material Science*, **28**, 429-442.
- 35) \* Kubair, D., Geubelle, P. H. and Lambros, J. (2003) "Fully plastic asymptotic analysis of a mode 3 stationary crack in a functionally graded material". To appear in *J. Applied Mechanics*.
- 36) \*! Maiti, S., Rangaswamy, K. and Geubelle, P. H. (2005) "Mesoscale analysis of dynamic fragmentation of ceramics under tension". *Acta Materialia*, **53:3**, 823-834.
- 37) \* Zhang, P., Jiang, H., Huang Y., Geubelle, P. H. and Hwang, K. C. (2004) "An atomistic-based continuum theory for carbon nanotubes: analysis of fracture nucleation". *J. Mech. Physics Solids*, **52:5**, 977-998.
- 38) \*! Maiti, S. and Geubelle, P. H. (2005) "A cohesive model for fatigue failure of polymers". *Eng. Fracture Mechanics*, **72:5**, 691-708.
- 39) Tan, H., Liu, C. T., Huang, Y. and Geubelle, P. H. (2004) "The effect of nonlinear debonding on the constitutive model of composite materials: experimental and theoretical studies". To appear in *J. Mech. Physics Solids*.
- 40) \* Kandula, S., Abanto-Bueno, J., Geubelle, P. H. and Lambros, J. (2004) "Cohesive modeling of dynamic fracture of functionally graded materials". *Int. J. Fracture*, **132**, 275-296.
- 41) \* Hendrickx, J., Geubelle, P. H. and Sottos, N. R. (2005) "A spectral scheme to simulate the mode III dynamic delamination of thin films". *Eng. Fracture Mech.*, **72**, 1866-1891.
- 42) \*! Maiti, S. and Geubelle, P. H. (2004) "Cohesive modeling of fatigue in self-healing polymers: Crack closure effect". To appear of *Eng. Fracture Mech.*
- 43) \* Tan, H., Liu, C., Huang, Y. and Geubelle, P. H. (2004) "The effect of nonlinear interface debonding on the constitutive model of composite materials". To appear in *Int. J. Multiscale Computational Engg.*
- 44) \* Tan, H., Huang, Y., Liu, C. and Geubelle, P. H. (2005) "The Mori-Tanaka method for composite materials with nonlinear interface debonding". *Int. J. Plasticity*, **21**, 1890-1918.
- 45) \* Tan, H., Liu, C., Huang, Y. and Geubelle, P. H. (2005) "The cohesive law for the particle/matrix interfaces in high explosives". *J. Mech. Physics Solids*, **53**, 1892-1917.
- 46) \* Jaiman, R. K., Jiao, X., Geubelle, P. H. and Loth, E. (2004) "Assessment of conservative load transfer schemes for nonmatching interface in fluid-solid interaction". To appear in *Int. J. Numer. Meth. Eng.*
- 47) \* Matous, K. and Geubelle, P. H. (2005) "Multiscale analysis of particle debonding in reinforced elastomers subjected to finite deformation". To appear in *Int. J. Numer. Methods in Engg.*

Geubelle, P. H. and Knauss, W. G. (1993) "Crack propagation in homogeneous and bimaterial sheets under general in-plane loading : Nonlinear analysis", in "Ultrasonic Characterization and Mechanics of Interfaces", S. I. Rokhlin, S. K. Datta and Y. D. S. Rajapakse, eds; Proceeding of the 1993 ASME Winter Annual Meeting in New Orleans, LA; Nov.28-Dec.3, 1993.

Jung, D., Hegeman, A., Sottos, N. R., Geubelle, P. H. and White, S. R. (1997) "Self-healing composites using embedded micro-spheres," *Composite and Functionally Graded Materials*, Jacob, K., Katsube, N., and Jones, W., Eds., Vol. MD-80, in Proceedings of the ASME International Mechanical Engineering Conference and Exposition, pp. 265-275.

Wood, B., Loth, E., and Geubelle, P. H. (1999) "Mesoflaps for aeroelastic transpiration for SBLI control", 37th Aerospace Sciences Meeting, Reno NV, January 1999; AIAA 99-0614.

Wood, B., Loth, E., and Geubelle, P. H. (1999) "Shock/boundary-layer interaction control with aeroelastic transpiration". 3rd ASME/JSME Joint Fluids Engineering Conference, San Francisco CA, July 17-21, 1999; FEDSM99-6924.

Geubelle, P. H., Lin, G. and Sottos, N. R. (1999) "Simulation of a fiber pushout test in model polyester/epoxy composite". Proceedings of ICCM-12, Paris, July 5-9, 1999.

Geubelle, P. H., Breitenfeld, M. S., Kubair, D. and Hwang, C. (2000) "Simulation of fundamental dynamic fracture problems using a spectral scheme". In *Advances in Computational Engineering & Sciences*. Edited by S. N. Atluri and F. W. Brust. Tech. Science Press. Proceedings of ICES2K held in Anaheim, CA, in August 2000.

Zhu, Q. and Geubelle, P. H. (2000) "Effects of the manufacturing process on the dimensional accuracy of thermoset composites". Proceedings of ASME IMECE 2000 in Orlando, November 2000.

Hwang, C. and Geubelle, P. H. (2000) "Subsonic and intersonic crack propagation in unidirectional and cross-ply composites". Proceedings of ASME IMECE 2000 in Orlando, November 2000.

Wood, B., Loth, E., Geubelle, P. H. and McIlwain, S. (2000) "A numerical methodology for an aeroelastic SBLI Flow". 38<sup>th</sup> Aerospace Sciences Meeting, Reno, NV, 10-13 January 2000. Paper AIAA 2000-0552.

Gefroh, D. L., Hafenrichter, E. S., McIlwain, S. T., Loth, E., Dutton, C. J. and Geubelle, P. H. (2000) "Simulation and Experimental Analysis of a Novel SBLI Flow Control System". AIAA Fluid 2000 Conference, 19-22 June 2000, Denver, CO. Paper AIAA 2000-2237.

Geubelle, P. H., Huang, C., Fiedler, R., Breitenfeld, M. S. and Haselbacher, A. (2001) "Simulation of dynamic fracture events in solid propellant rockets". 37<sup>th</sup> AIAA/ASME/SAE/ASEE JPC Conference and Exhibit, July 8-11, 2001. Paper AIAA 2001-3953.

Lambros, J., Bi X. and Geubelle, P. H., "The mechanics of dynamic fiber push-out: experimental and numerical study", IMECE 2001, New York, NY, November 2001.

Lambros, J., Bi, X. and Geubelle, P. H. "High-speed debonding and frictional sliding in composite systems: experimental observations and numerical simulations." Proceedings of ICF 10. Honolulu, December 2-7, 2001.

Geubelle, P. H. and Maiti, S. "Simulation of damage mechanisms in high-speed grinding of structural ceramics." Proceedings of ICF 10. Honolulu, December 2-7, 2001.

Hwang, C., Massa, L., Fiedler, R. and Geubelle, P. H. "Simulation of convective burning and dynamic fracture in solid propellants." 38<sup>th</sup> AIAA/ASME/SAE/ASEE JPC Conference and Exhibit, July 7-10, 2002. Paper AIAA 2002-4342.

Fiedler, R. A., Breitenfeld, M. S., Jiao, X., Haselbacher, A. Geubelle, P. H., Guoy, D. and Brandyberry, M. "Simulations of slumping propellant and flexing inhibitors in solid propellant rocket motors." 38<sup>th</sup> AIAA/ASME/SAE/ASEE JPC Conference and Exhibit, July 7-10, 2002. Paper AIAA 2002-4341.

Maiti, S., Rangaswamy, K. and Geubelle, P. H. "Fragmentation of ceramics in rapid expansion mode." Proceedings of the 8<sup>th</sup> Conference of the Fracture Mechanics of Ceramics. Houston, TX. February 25-28, 2003.

Geubelle, P. H., Maiti, S. and Rangaswamy, K. "Mesoscale modeling of fragmentation of ceramics under dynamic compressive loading. Proceedings of ICF11, Turin, Italy, March 2005.

Geubelle, P. H., Hendrickx, J. and Sottos, N.R. "Spectral scheme for analysis of dynamic delamination of a thin film." . Proceedings of ICF11, Turin, Italy, March 2005.

Geubelle, P.H., Dantuluri, V., Koppaka, S.B. and Phinney, L. "Cohesive modeling of adhesion reduction of mems cantilevers through laser heating". Proceedings of ICF11, Turin, Italy, March 2005.

White, S.R., Maiti, S., Jones, A., Brown, E.N., Sottos, N.R. and Geubelle, P.H. "Fatigue of self-healing polymers: multiscale analysis and experiments". Proceedings of ICF11, Turin, Italy, March 2005.

Matous, K., Inglis, H. M., Gu, X., Jackson, T., Rypl, D. and Geubelle, P. H. "Multiscale Damage Modeling of Solid Propellants: Theory and Computational Framework". 41<sup>st</sup> AIAA/ASME/SAE/ASEE JPC Conference and Exhibit, July 10-13, 2005. Tucson, AZ. Paper AIAA 2005-4347.

Tan, H., Huang, Y., Geubelle, P. H., Liu, C. and Breitenfeld, M. S. "An Energy Approach to a Micromechanics Model Accounting for Nonlinear Interface Debonding". 41<sup>st</sup> AIAA/ASME/SAE/ASEE JPC Conference and Exhibit, July 10-13, 2005. Tucson, AZ. Paper AIAA-2005-3995.

f. Publications in above categories which have been submitted for publication but not yet accepted

Hwang, C. G., Fiedler, R., Acharya, A. and Geubelle, P. H. (2004) "Simulation of fluid-structure interaction and dynamic fracture events in solid propellant rockets". Submitted to *Int. J. Numerical Methods Eng.*

Kandula, S., Abanto-Bueno, J., Geubelle, P. H. and Lambros, J. (2004) "Cohesive modeling of quasi-static fracture in functionally graded materials". Submitted to *J. Applied Mechanics*.

Matous, K. and Geubelle, P. H (2005) "Finite element formulation for modeling particle debonding in reinforced elastomers subjected to finite deformations". Submitted to *Computer Methods in Applied Mechanics and Engineering*.

Hendrickx, J., Geubelle, P. H. and Sottos, N. R. (2005) "Spectral simulations of mode III dynamic delamination of patterned thin films". Submitted to *Eng. Fracture Mech.*

Dantuluri, V., Maiti, S. and Geubelle, P. H. (2005) "Cohesive modeling of delamination in Z-pin reinforced composite laminates". Submitted to *Composite Science and Technology*.

Maiti, S., Geubelle, P. H. and Kieffer, J. (2005) "Continuum- and molecular-level modeling of fatigue crack propagation in self-healing composite". Submitted to *J. Engg. Mater. Techn.*

g. Other (*patents, bulletins and reports, magazine articles, etc.*)

Patents

“Multifunctional autonomically healing composite material”. White, S. R., Sottos, N. R., Geubelle, P. H., Moore, J. S., Sriram, S. R., Kessler, M. R., Brown E. N. U.S. Patent # 6,518,330.

“Method and apparatus for control of shock/boundary-layer interactions”. Loth, E., Dutton, C., Geubelle, P. H., White, S., Tortorelli, D. and Alleyne, A. U.S. Patent # 6,651,935.

### Reports

Geubelle, P. H. (1994) “Implementation of a 3D elastodynamic boundary-integral code on the CM-5”. Mech-240 Report, Division of Applied Sciences, Harvard University.

Geubelle, P. H., Danyluk, M. J. and Hilton, H. H. “Dynamic Mode 3 Fracture in Viscoelastic Media” Report AAE 96-03, UILU ENG 96-0503.

Geubelle, P. H. and Breitenfeld, M. S. “Numerical analysis of dynamic debonding under anti-plane shear loading” Report AAE 96-12, UILU ENG 96-0512.

Geubelle, P. H. “A numerical method for elastic and viscoelastic dynamic fracture problems in homogeneous and bimaterial systems” Report AAE 96-14, UILU ENG 96-0514.

### Papers Presented at National Meetings (and not in bound conference proceedings - \* denotes invited paper)

Geubelle, P. H. and Rice, J. R. “A spectral method for 3D dynamic fracture problems”. Third U. S. National Congress on Computational Mechanics. Dallas, TX. June 12-14, 1995.

Geubelle, P. H., Breitenfeld, M. S. and Danyluk, M. J. “Spectral method for 3D bimaterial and viscoelastic dynamic fracture problems”. 1996 ASME Mechanics and Materials Conference. Johns Hopkins University, Baltimore, MD. June 12-14, 1996.

Geubelle, P. H. and Breitenfeld, M. S. “A spectral method for 2D and 3D dynamic debonding problems”. IUTAM Symposium on Innovative Computational Methods for Fracture and Damage. Dublin, Ireland. June 30 - July 5, 1996.

Geubelle, P. H., Danyluk, M. J. and Hilton, H. H. “Rupture mechanics in viscoelastic media”. 33rd Annual Technical Meeting of the Society of Engineering Science. Tempe, AZ. October 20-23, 1997.

\*Geubelle, P. H. and Breitenfeld, M. S. “Mechanics of three-dimensional dynamic failure of interfaces”. International Mechanical Engineering Congress, Atlanta, GA. November 17-22, 1996.

Baylor, J. and Geubelle, P. H. “Dynamic simulations of impact-induced delamination in composites”. McNU’97. Joint ASME/ASCE/SES Meeting at Northwestern University, Evanston, IL. June 29 - July 2, 1997.

Geubelle, P. H. and Breitenfeld, M. S. “Use of massively parallel computers in 3D dynamic fracture: a practical experience”. Fourth U. S. National Congress on Computational Mechanics. San Francisco, CA. August 6-8, 1997.

\*Li, Z., Lambros, J., Bi, X. and Geubelle, P. H. “Dynamic thermo-mechanical behavior of fiber reinforced composites”. 13th National Congress of Applied Mechanics. Gainesville, FL. June 21-26, 1998.

Geubelle, P. H. and Breitenfeld, M. S. “Frictional dynamic failure of bimaterial interfaces”. 13th National Congress of Applied Mechanics. Gainesville, FL. June 21-26, 1998.

Geubelle, P. H. "Frictional effects in dynamic failure of interfaces: a numerical analysis using a spectral scheme". Symposium on Damage Accumulation and Fracture at High Strain Rates. Los Alamos, NM. June 18-19, 1998.

Geubelle, P. H. "Simulations of spontaneous dynamic crack growth in a layered composite using a cohesive/volumetric finite element scheme". Int. Conference on Computational Engineering Science. Atlanta, GA. October 6-9, 1998.

\*Geubelle, P. H., Bi, X. and Lambros, J. "Axisymmetric simulations of dynamic fiber pull-out/push-out in a fiber reinforced polymeric matrix composite". International Conference on Computational Engineering Science. Atlanta, GA. October 6-9, 1998.

\*Geubelle, P. H. "A spectral scheme for 3D dynamic fracture simulations: survey and recent developments". ASME Winter Annual Meeting. Anaheim, CA. November 16-20, 1998.

Geubelle, P. H., Bi, X., Lin, G., Lambros, J. and Li, Z. "Simulation of quasi-static and dynamic fiber pull-out/push-out in a model composite system". Fifth USNCCM, Boulder, CO. August 4-6, 1999.

\*Geubelle, P. H., Kubair, D. and Huang, Y. "Transonic crack propagation under shear-dominated loading". SES Meeting, Austin, TX. October 1999.

\*Geubelle, P. H., Sottos, N. R. and Lambros, J. "Quasi-static and dynamic fiber pushout in a model composite system: an analytical and experimental study". SES Meeting, Austin, TX. October 1999.

\*Li, Z., Lambros, J., Geubelle, P. H. and Bi, X. "A novel technique to investigate dynamic fiber debonding and frictional sliding in model composites". ASME IMECE, Nashville, TN, November 1999.

\*Geubelle, P. H., Hwang, C. and Kubair, D. "Spectral scheme analysis of fundamental dynamic fracture problems." APS Meeting, Minneapolis, March 20-24, 2000.

\*Geubelle, P. H. "Numerical simulation of dynamic fracture problems." MAPINT2000 conference, Dayton, OH, August 15-17, 2000.

Zhu, Q. and Geubelle, P. H. "Process-induced residual stresses and warpage in polymer composites." ICTAM 2000 Conference, Chicago, Aug. 27 – Sept. 2, 2000.

Kubair, D. and Geubelle, P. H. "Intersonic crack propagation in homogeneous media under shear-dominated mixed-mode loading." ICTAM 2000 Conference, Chicago, Aug. 27 – Sept. 2, 2000.

Brown, E.N., Sottos, N.R., White, S.R., Geubelle, P.H. and Moore, J.S. "Self-healing composites using embedded microspheres: Fracture toughness of epoxy matrix." ICTAM 2000 Conference, Chicago, Aug. 27 – Sept. 2, 2000.

Maiti, S. and Geubelle, P.H. "Simulation of damage mechanisms in high-speed grinding of ceramics." ICTAM 2000 Conference, Chicago, Aug. 27 – Sept. 2, 2000.

\*Geubelle, P.H. and Acharya, A. "Thermoelastic spectral analysis of dynamically propagating cracks." 37<sup>th</sup> Annual Technical Meeting of the SES, Columbia, S.C., October 23-25, 2000.

\*Geubelle, P.H. "Spectral scheme simulations of dynamic fracture problems." IMECE 2000, Orlando, FL. Nov. 2000.

\*Hwang, C. and Geubelle, P.H. "Subsonic and intersonic crack propagation in unidirectional and cross-ply composites." IMECE 2000, Orlando, FL. Nov. 2000.

Lambros, J., Bi, X. and Geubelle, P. H. "An experimental and numerical study of dynamic fiber push-out in composite materials." MMC2001, San Diego, CA. June 27-29, 2001.

Kubair, D., Geubelle, P. H. and Huang, Y. "Effect of rate dependence in cohesive zones under dynamic crack propagation." MMC2001, San Diego, CA. June 27-29, 2001.

Geubelle, P. H. and Maiti, S. "Simulation of single-grit high-speed scratch test in ceramic materials." MMC2001, San Diego, CA. June 27-29, 2001.

Zhu, Q., Geubelle, P. H., Li, M. and Tucker, C. L. "Dimensional accuracy of thermoset polymer composites: process simulation and optimization." 6<sup>th</sup> U.S. National Congress on Computational Mechanics. Dearborn, MI. July 31-Aug. 4, 2001.

Breitenfeld, M. S. and Geubelle, P. H. "A spectral scheme for 2-D and 3-D fundamental dynamic contact problems." 6<sup>th</sup> U.S. National Congress on Computational Mechanics. Dearborn, MI. July 31-Aug. 4, 2001.

Geubelle, P. H., Hwang, C. and Fiedler, R. A. "Coupled simulation of dynamic fracture events in solid propellant rockets." 6<sup>th</sup> U.S. National Congress on Computational Mechanics. Dearborn, MI. July 31-Aug. 4, 2001.

Maiti, S. and Geubelle, P. H. "Dynamic indentation of ceramic materials: simulation of damage processes," 6<sup>th</sup> U.S. National Congress on Computational Mechanics. Dearborn, MI. July 31-Aug. 4, 2001.

\*Lambros, J., Bi, X. and Geubelle P. H. "The mechanics of dynamic fiber push-out: experimental and numerical study". ASME winter annual meeting, New York, NY, 2001.

\*Bi, X., Lambros, J. and Geubelle P. H. "Experimental-numerical coupling in the study of dynamic fiber pushout in model composites". SEM Conference and Exposition, Milwaukee, WI, June 10-12, 2002.

\*Geubelle, P. H. "Mesoscale modeling of dynamic fracture in ceramic materials." International Congress on Mesomechanics. Aarlborg, Denmark, August 2002.

\*Bi, X., Lambros, J. and Geubelle P. H., "A modified split Hopkinson pressure bar for the study of dynamic fiber pushout", IMECE 2002, New Orleans, LA, November 2002.

Geubelle, P. H. "Cohesive finite element simulation of dynamic fracture". Aerospace Science Symposium, Dayton, OH. March 4, 2003.

Abanto-Bueno, J. L., Kandula S., Lambros, J. and Geubelle, P.H. "Experimental and numerical study of quasi-static and dynamic fracture of functionally graded materials." SEM Annual Conference on Experimental and Applied Mechanics, Charlotte, North Carolina, June 2-4, 2003

Geubelle, P.H., Maiti, S. and Rangaswamy, K. "Mesoscale modeling of dynamic fragmentation of ceramics". ASME-AMD Summer Meeting, Scottsdale, AZ, June 18-20, 2003.

Sottos, N.R., Brown, E.N., Maiti, S., Geubelle, P. H., White, S.R. "Analysis and Characterization of Autonomic Crack Healing During Fatigue". ASME-AMD Summer Meeting, Scottsdale, AZ, June 18-20, 2003.

\*Geubelle, P. H. "Mesoscale cohesive modeling of dynamic fracture and fragmentation of ceramics". Ringberg Workshop on Dynamic Fracture. Ringberg, Germany, July 10-15, 2003.

USNCCM meeting in Albuquerque, NM – July 21-25, 2003 – 3 papers (all invited)

\*Geubelle, P. H. "A self-healing composite concept". Galcit 75<sup>th</sup> Reunion, Solid Mechanics Symposium. Caltech, Pasadena, CA, November 13-14, 2003.

Lambros, J., Geubelle, P.H. and Kubair, D. "Asymptotic analysis of a stationary crack in a ductile functionally graded material subjected to mode III loading". IMECE 2003, Washington, D.C., November 15-21, 2003.

Geubelle, P.H. and Maiti, S. "Cohesive element simulation of fatigue in a self-healing composite". IMECE 2003, Washington, D.C., November 15-21, 2003.

Geubelle, P.H., Maiti, S. and Rangaswamy, K. "Mesoscale modeling of fragmentation of ceramics". IMECE 2003, Washington, D.C., November 15-21, 2003.

Lambros, J., Geubelle, P. H. and Bi, X. "Shear dominated dynamic debonding along polymer/metal interfaces: Experiments and simulations", 2nd International Workshop on Multiscale Modeling of Strength and Fracture: Linking Through the Mesoscale, Lawrence Livermore National Laboratory, Berkeley, CA, Jan. 7-9 2004.

Matous, K. and Geubelle, P. H. "Multiscale damage modeling of reinforced elastomers: Theory and computational framework". USNCCM 8, Austin, TX, July 24-28, 2005.

Breitenfeld, M. S. and Geubelle, P. H. "Large scale massively parallel simulations of fault dynamics using a spectral scheme". USNCCM 8, Austin, TX, July 24-28, 2005.

Geubelle, P. H., Kandula, S., Hendrickx, J. M. and Sottos, N. R. "Laser-induced delamination patterned thin films: experiments and spectral analysis". USNCCM 8, Austin, TX, July 24-28, 2005.

Jaiman, R., Jiao, X., Geubelle, P.H. and Loth, E. "Assessment of conservative load transfer for fluid-solid interface with nonmatching meshes." USNCCM 8, Austin, TX, July 24-28, 2005.

#### Invited (non-conference) presentations

"A spectral scheme for three-dimensional dynamic fracture problems". University of Delaware, Solid Mechanics Seminar Series. November 8, 1996.

"Simulation of 3D dynamic fracture events". University of Michigan, Department of Aerospace Engineering. February 1997.

"Numerical simulation of dynamic fracture : Spectral scheme". University of Illinois, AAE Departmental Graduate Seminars. November 1998.

"Numerical simulation of dynamic fracture : Cohesive/volumetric finite element scheme". Center for the Simulation of Advanced Rockets, University of Illinois. March 1999.

"Fundamental problems in dynamic fracture mechanics". University of Illinois, Department of Theoretical and Applied Mechanics. March 9, 2000.

"Spectral-based simulations of 2D and 3D fundamental dynamic fracture problems". University of Notre Dame. Department of Aerospace Engineering. April 4, 2000.

"Numerical analysis of dynamic fracture". Washington University in St. Louis. Department of Mechanical Engineering. Sept. 14, 2000.

"Simulation of dynamic fracture events". Northwestern University. Solid Mechanics Seminar. Dec.1, 2000.

"Simulation of dynamic fracture events in solid propellant rockets". University of Iowa. Mechanical Systems Graduate Seminar. November 1, 2001.

“A self-healing composite”. C.R.I.F. Solid Mechanics Seminar. Sart-Tilman, Liège, Belgium. November 23, 2001.

“Dynamic failure of solid propellant rockets”. Los Alamos National Lab. Combustion Seminar. December 13, 2001.

“Numerical modeling of dynamic fracture”. CESAME Seminar Series, Catholic University of Louvain, Belgium. October 15, 2002

“Self-healing composite concept”. Materials Research Seminar Series, Max Planck Institute, Stuttgart, Germany. November 2002.

“Failure of a self-healing composite under monotonic and fatigue loading”, University of Notre Dame, December 2003.

“Monotonic and fatigue failure of a self-healing composite”, Johns Hopkins University, March 2004.

“Failure of a self-healing composite under monotonic and fatigue loading: experiments and cohesive modeling”, University of Maryland, March 1, 2005.

“Fatigue response of a self-healing composite: experiments and multiscale modeling”, Brown University, April 4, 2005.

“Multiscale cohesive modeling of self-healing composite”, Michigan Tech., April 21, 2005.

2. Grants, Contracts and gifts received for your research and teaching (in chronological order for past six years)

a) For Research

Years	Brief Title or Description	Source of Funds	Total funding	Funding Allocated to this Professor	# of PI's & Lead PI if not this Professor
97-01	Experimental and Analytical Investigation of Dynamic Fiber Pull-Out in Composites	NSF	\$252,000	\$110,000	2 (P. Geubelle, PI)
97-07	ASCI Center for the Simulation of Advanced Rockets	DOE	\$40,000,000	\$1,800,000	20 (M. Heath, PI)
97-00	Dimensional Stability and Optimization of Composite Manufacturing	NSF	\$305,000	\$100,000	3 (S. White, PI)
97-99	Preliminary Numerical Design of Smart Bleeding System for Supersonic Inlets (2-year CSE Fellowship – Brett Wood, Graduate Student)	CSE, UIUC	\$50,000	\$50,000	2 (P. Geubelle, PI)
98-02	High Speed Grinding of Ceramics	NSF (Career Award)	\$208,000	\$208,000	1 (P. Geubelle, PI)
98	Smart Mesoflaps for Aeroelastic Transpiration for SBLI Flow Control	AFOSR	\$85,401	\$20,000	5 (E. Loth, PI)
99-02	Smart Mesoflaps for Aeroelastic Transpiration for SBLI Flow Control	DARPA	\$2,120,318	\$200,000	6 (E. Loth, PI)
98-00	Health Monitoring and Maintenance of Composite Structures	UIUC, CRI	\$200,000	\$50,000	3 (S. White, PI)
99-01	Development of Self-Healing Structural Composite Materials	AFOSR	\$85,662	\$20,000	4 (S. White, PI)
01-04	Dynamic Fracture of Functionally Graded Materials	NSF	\$330,000	\$100,000	3 (G.Paulino, PI)

01-02	Dynamic Failure of Z-Pinned Composite Laminates	AFSOR (SBIR – Phase I)	\$200,000	\$20,000	1 – Academic consultant for AdTech Syst., Dayton, OH
03-04	Quasi-Static and Dynamic Failure of Z-Pinned Composite Laminates	AFOSR (SBIR – Phase II)	\$700,000	\$130,000	1 – Subcontract for AdTech Syst., Dayton, OH
01-05	A Finite Element Framework for Very Large Scale Dynamic Fracture Simulations on the IBM BlueGene	NSF	\$750,000	\$95,000	4 (L. Kale, PI)
02-05	Multiscale Modeling of Fatigue Response of Self-Healing Structural Composite	AFOSR (MEANS)	\$900,000	\$250,000	3 (S. White, PI)
03-04	Development of a CVFE code for the simulation of dynamic response of a LNG insulation system	American Bureau of Shipping	\$30,000	\$30,000	1 (P. Geubelle, PI)
03-08	Illinois Space Grant	NASA	\$465,000/yr	NA	5 (P. Geubelle, PI)
04-07	Thin film fracture and decohesion in micro- and nano-patterned devices	NSF	\$250,000	\$100,000	2 (N. Sottos, PI)
05-10	Microvascular autonomic composite	AFOSR	\$1,200,000	\$180,000	9 (S. White, PI)
05-08	Multiscale Experimental and Numerical Design of a Self-Healing Epoxy Adhesive	NSF	\$310,000	\$120,000	4 (P. Geubelle, PI)
05-07	Multiscale modeling of damage in solid propellants	ATK-Thiokol	\$288,770	\$140,000	2 (K. Matous, PI)
05-06	NASA Space Grant Augmentation	NASA	\$162,875	NA	3 (P. Geubelle, PI)

## b) For Instruction

Years	Brief Title or Description	Source of Funds	Total funding	Funding Allocated to this Professor	# of PI's & Lead PI if not this Professor
98	Undergraduate Course Development Award: Development of AAE 270	UIUC PI	\$8,000	\$8,000	1 (P. Geubelle, PI)
00-01	Innovative use of information technology for curriculum redesign	UIUC PI	\$38,000	\$38,000	3 (P. Geubelle PI)
04-05	NASA Workforce Development Grant – Development of Aerospace UROP	NASA	\$100,000	NA	3 (P. Geubelle, PI)
04-05	UROP in Aerospace Engineering and Science	Boeing	\$25,000	NA	2 (P. Geubelle, PI)

## 3. Areas of Research (brief description, key words are adequate)

Fracture mechanics  
 Computational solid mechanics  
 Manufacturing  
 Computational aeroelasticity  
 Multiscale modeling of advanced materials  
 High performance computing  
 Computational design of biomimetic materials

## 4. Graduate Thesis Research Advising

## (a) M.S. Degrees (name and year)

M. J. Danyluk	1996
A. Hegeman (S. White, co-advisor)	1997
J. Baylor	1997

M. S. Breitenfeld	1997
B. Wood (E. Loth, co-advisor)	1999
S. Viswanathan	2000
M. Zaczek	2001
J. Thomas	2002
L. Ozkahya	2003
K. Soma	2004
V. Dantuluri	2004
K. Rangaswamy	2004
S. Mangala	In progress
B. Roe	In progress
H. Dewey (B. Balachandar, co-advisor)	In progress
N. Chennimalai	In progress
P. Nittur	In progress
R. Page	In progress

## (c) Ph.D. Degrees (name and year)

Q. Zhu	2000
D. Kubair	2001
S. Maiti	2002
X. Bi (J. Lambros, co-advisor)	2003
H. Inglis	In progress
R. Jaiman (E. Loth, co-advisor)	In progress
K. Srinivasan (T. Jackson, co-advisor)	In progress
K. Soma (N. Sottos, co-advisor)	In progress
M. Kulkarni	In progress

## 5. Editorships of Journals or Other Learned Publications

None

## 6. Post-doctoral Associates and Visiting Scientists (&gt;3 months stay) in the past 3 years (list name, year(s), country of origin, permanent employer)

G. Lin, Post-doc, 1998-1999, China, Ansys, Pittsburgh, PA  
 C. Hwang, Post-doc, 1999-2003, Korea, Seoul Information Technology University  
 S. Maiti, Post-doc, 2002-present, India  
 K. Matous, Research Scientist, 2003-present  
 S. Breitenfeld, Research Programmer, 1999-present

## 7. Other Scholarly Activities in the past 5 years (conferences organized or chaired, unpublished presentations, etc.)

Organizer and chairman of a symposium on Dynamic Rupture Mechanics, ASME Summer Meeting, Baltimore, June 1996.

Organizer and chairman of a symposium on Experimental and Numerical Fracture Mechanics, ASME Summer Meeting, Chicago, June 1997.

Organizer and chairman of a symposium on Recent Advances in Dynamic Properties of Materials, ASME IMECE 2000, Orlando, November 2000.

Organizer of a symposium on Dynamic Fragmentation of Brittle Materials, ASME IMECE 2004, Anaheim, November 2004.

Co-organizer on Fragmentation of Brittle Materials, ASME IMECE 2005, Orlando, November 2005.

Reviewer for the AIAA Journal  
 Reviewer for the International Journal of Fracture  
 Reviewer for the International Journal of Solids and Structures  
 Reviewer for the Journal of the Mechanics and Physics of Solids  
 Reviewer for the Journal of Engineering Materials and Technology  
 Reviewer for the Quarterly Journal of Mechanics and Applied Mathematics  
 Reviewer for the Communications in Numerical Methods in Engineering  
 Reviewer for the International Journal for Numerical Methods in Engineering  
 Reviewer for the Journal of Applied Mechanics  
 Reviewer for Engineering Fracture Mechanics  
 Reviewer for the Journal of Engineering Mechanics  
 Reviewer for Mechanics of Materials  
 Reviewer for Proceedings A of the Royal Society of London  
 Reviewer for Mechanics Research Communications  
 Reviewer for Computational Mechanics  
  
 Reviewer for NSF proposals (Jan. 98 review panel)  
 Reviewer for ISF proposal (Israel Science Foundation) – April 2002  
 Reviewer for CDRF proposal (2005)

### C. Service in the Past Three Years

#### 1. Professional Society (list membership; office held, with dates; major committees or boards)

Memberships	American Society of Mechanical Engineers (ASME) U.S. Association for Computational Mechanics (USACM) American Institute of Aeronautics and Astronautics (AIAA) Society of Engineering Science (SES) American Academy of Mechanics (AAM)
Technical Committees	ASME Fracture Mechanics Committee ASME Computational Mechanics Committee ASME Dynamic Behavior of Materials Committee (Secretary 2005-2007)

#### 2. University (department, college and campus committees, administration, etc.)

ASCI/CSAR Science Steering Committee (1997 to present)  
 Department Admission Committee (Chair 1998-2003)  
 Department Undergraduate Curriculum Committee (1995-2000, 2002-present)  
 Department Advisory Committee (1998-2000, 2003-present)  
 Department Computer Resource Committee (1999-2000)  
 Department Qualifying Exam Committee (Chair, 2000-2001)  
 Department Ad Hoc Teaching Assistanship Committee (Chair, 2001-2002)  
 Department T.A. Committee (2002-present)  
 Department Computer Committee (2004-present)  
 Department Faculty Search Committee (Chair, 2003)  
 Department *ad hoc* Committee on Future Qualifying Exam (2004)  
 Department Planning Committee (2003-present)  
 College Engineering Workstation Steering Committee (1997 to 2002, Chair 9/2001 to 5/2002)  
 College Strategic Planning Committee (2002-2003)  
 College Search Committee in Nano-Technology (2004-2005)  
 College Search Committee for CEE Department Chair (2004)  
 College Committee on Teaching Improvement (2005)

#### 3. Federal and State (*government commissions and panels, community, industrial extension, etc.*)

IMM Think Tank on the role of experimental mechanics in current U.S. research program, Houston, March 25-26, 1996  
Reviewer for NSF proposals (Jan. 98 review panel)  
Illinois Space Grant Director (2003-present)

3. Other Outside Service

Director of Illinois Aerospace Institute for high school students (Summers of 96 to 01)

**D. Other Service**

**E. Improvement Activities** (list any specific programs in which you have participated to improve teaching and professional competence)

Retreats on active learning, UIUC (1999, 2001)