The Department of Mechanical Engineering and Applied Mechanics (MEAM) went through a formal review in Spring 1998. The members of the External Review Committee were:

Professor Richard O. Buckius, Head, Department of Mechanical and Industrial Engineering, University of Illinois-Champaign-Urbana; Professor Ronald K. Hanson, Chair, Department of Mechanical Engineering, Stanford University; Professor J. Karl Hedrick, Department of Mechanical Engineering, University of California-Berkeley; Dr. Roger L. McCarthy, Chairman of the Board, Failure Analysis Associates; Dr. William Powers, Vice-President for Research, Ford Motor Company; Professor Nam P. Suh, Chair, Department of Mechanical Engineering, Massachusetts Institute of Technology (MIT); and Professor David Wormley, Dean, College of Engineering, Pennsylvania State University-University Park.

This distinguished group spent two days with MEAM faculty, students, and staff. They also toured the facilities, visited various laboratories, and were provided with a detailed report on the Department compiled by an Internal Review Committee chaired by former MEAM Chair Professor Richard E. Sonntag.

The following are some brief excerpts from the External Review Committee's report:

"...we found evident, justified, and growing pride in the continued improvement of the Department in all areas: faculty, staff, students, and facilities."

"In summary, we believe that the Department has made very significant progress in the past five years and has a good foundation to move forward."

A Message from the Chairs

They also urged MEAM to look ahead, with...

"...the development of a strategic vision, and consensus-building process, while maintaining a strong focus on continued recruitment of top students and the development of outstanding faculty."

We take pride in their positive assessment of the state-of-the-Department and appreciate their advice for moving ahead in the coming years.

This 1997-98 MEAM Annual Report summarizes our activities for the past year. You will find described in the following pages some of the specific accomplishments that contributed to the conclusions of the External Review Committee. Even as we celebrate these recent accomplishments by MEAM students, faculty, and staff, we look forward to the future. This is a highly opportune time in the history of the Department to reaffirm our commitment to excellence and innovation in all of our core activities.

Panos Y. Papalambros
MEAM Chair, 1992-98

A. Galip Ulsoy
MEAM Chair, 1998-02
1997–98 Annual Report
Mechanical Engineering and Applied Mechanics

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External Advisory Board (EAB) members Michael E. Korybalski (l.) and George S. Springer (cfr.) accompany Professor Panos Y. Papalambros on a tour of MEAM facilities, during the Spring EAB meeting.
Above: A view of the "High Bay" from the mezzanine of the new Integrated Manufacturing Systems Laboratory (IMSL) in the Herbert H. Dow Building, dedicated on May 26, 1998. Top right: ERC/RMS staff members Kim Ficaro, administrative associate II, seated, and Zbigniew Pasek, program manager, move in. Top left: U-M art school student, Tara Lindstrom, works on the imposing mural in the IMSL.
A major relocation of all of MEAM's machining research activities into a new Integrated Manufacturing Systems Laboratory (IMSL) in the Herbert H. Dow Building.

A new $5 million General Motors Satellite Research Laboratory located in MEAM as a joint effort of University and industry researchers.

The creation of a new Combustion and Synthesis Kinetics and Diagnostics Laboratory and further growth of such ongoing interdisciplinary ventures as research on mobility in older adults, development of a microassembly process for microelectromechanical (MEMS) devices, the Center for Laser Aided Intelligent Manufacturing (CLAIM), and the National Science Foundation (NSF) Engineering Research Center for Reconfigurable Machining Systems (ERC/RMS), to name just a few.

A more open, user-friendly atmosphere in the newly remodeled and reorganized Academic Services Office (ASO)—including the addition of an undergraduate peer counselor and a graduate student recruiter.

These are just some of the exciting activities of growth and development that marked the 1997–98 academic year at the College of Engineering's (CoE) Department of Mechanical Engineering and Applied Mechanics (MEAM).

In every corner—from faculty research and discovery to student achievement and success—MEAM reached forward to new heights, strengthened in large part by a wide range of innovative partnerships and collaborations. As MEAM continued to forge close working relationships between far-reaching disciplines at the University, throughout business and industry, and with higher education here and abroad, the Department continued its pursuit of excellence.

The following takes a closer look at some of MEAM's major accomplishments during the 1997–98 school year.
EAM's Undergraduate Program saw many changes during the academic year. Associate Professor Michael Thouless accepted the position of undergraduate program chair. MEAM's new 4x4x8 undergraduate course structure was put in place. In addition, MEAM created a new peer counselor position, filled by ME graduate student, Scott Partridge (BS ME '96), to help students better understand the curriculum changes and graduation requirements and serve as an information source as students consider summer internships, career choices, and graduate school programs. The peer counselor is very accessible—students may stop by his office without an appointment.

MEAM's Graduate Program, which continued to be ranked in the top five programs in the country by U.S. News and World Report, nearly completed the restructuring of its new curriculum. Enrollment remained strong and steady, with growth in the Master of Automotive Engineering (MEng Auto) program.

The Graduate Program continued to intensify its efforts to recruit the very best students in the country. It created a new graduate student recruiter position. For the second year in a row, it held a prospective graduate student weekend, successfully recruiting nearly 50 percent of those students who attended.

The Academic Program

The new undergraduate peer counselor and graduate student recruiter positions were part of an expansion of the Academic Services Office (ASO) that took place during 1997–98. A major renovation of the space in 2206 G.G. Brown combined all Undergraduate and Graduate Programs' faculty and staff members in one place. The remodeled space not only has a more open feel, including a larger central area for students, it also allows the staffs to work more closely together.
The Mechanical Engineering Student Leader Board (MESLB) continued to make valuable contributions to MEAM, with the goal of improving communication and fostering a greater sense of community and cooperation among students. The MESLB is comprised of the presidents and/or representatives of MEAM's five student organizations (see below) as well as other student representatives and the Department's administrative associate.

One of the MESLB's major activities was to write and administer a student survey to be used as part of an overall Department review. Students were asked to complete comprehensive surveys about their educational experiences in MEAM.

Many MEAM students spend time actively involved in MEAM's student societies and organizations, which offer many service, academic, professional, and social activities throughout the school year. They include the American Society of Mechanical Engineers (ASME); Pi Tau Sigma (ΠΤΣ/PTS) National Mechanical Engineering Honor Society; Society of Automotive Engineers (SAE);

Underrepresented Minorities in Mechanical Engineering (UMME); and Graduates in Mechanical Engineering (GRIME).

Pi Tau Sigma's U-M Pi Rho Chapter received some national attention this academic year as the host of the 1997 National Pi Tau Sigma Convention in October. More than 125 students from 36 chapters across the U.S. attended the three-day annual convention. The keynote speaker was William S. Warren, director of engineering, Delphi Energy and Engine Management Systems, Flint, Michigan.


Left: UMME members celebrate the last day of classes by handing out free popsicles and ice cream bars at the annual CoE SpringFest.
MEAM's internationally recognized group of faculty continued to create an academic atmosphere dedicated to learning and investigation. In 1997–98, MEAM successfully recruited two new faculty members in the area of thermal and fluid sciences, including Associate Professor Volker Sick, who joined the faculty in September 1997, and Assistant Professor Margaret S. Wooldridge, who will begin in September 1998.

MEAM gratefully acknowledges the dedicated efforts and contributions of Professor Richard E. Sonntag (BSE ME '56, MSE '57, PhD '61), scheduled to retire December 1998, after a distinguished career spanning more than 35 years. Sonntag served as Department Chair from 1981 to 1992, earning a strong reputation of exemplary leadership, vision, and commitment.

Several MEAM faculty received outstanding national honors and recognitions during 1997–98. Six MEAM faculty members earned prestigious Early Career Development Awards from the National Science Foundation (NSF), including Assistant Professors Ellen M. Arruda, William J. Endres, S. Jack Hu (MSE '86, PhD '90), Liwei Lin, Huei Peng, and Ann Marie Sastry. Sastry was also one of 60 researchers selected to receive the second annual Presidential Early Career Awards for Scientists and Engineers (PECASE), the highest honor bestowed by the U.S. government to outstanding scientists and engineers beginning their careers.

MEAM's Acclaimed Faculty...

MEAM faculty members were involved in a wide range of groundbreaking research and activities in the Department's major centers and in their individual laboratories. Some highlights include:

- MEAM completed a move of all its machining research activities into a new Integrated Manufacturing Systems Laboratory (IMSL) in the Herbert H. Dow Building. The NSF Engineering Research Center for Reconfigurable Machining Systems (ERC/RMS), NSF Industry/University Cooperative Research Center (I/UCRC), S.M. Wu Manufacturing Research Center (WuMRC), and other machining-related projects were relocated to 20,000 square feet of renovated space. The CoE Program in Manufacturing (PIM) was also relocated there. The new facility brings together
research laboratories and equipment that had been housed throughout the G.G. Brown and Electrical Engineering and Computer Sciences (EECS) buildings. It also includes a testbed that houses state-of-the-art equipment for testing new RMS ideas and for training industry engineers in how to use RMS techniques and methodologies.

A new $5 million GM Satellite Research Laboratory was established at the University of Michigan. A letter of understanding was signed in January 1998 between the U-M College of Engineering and General Motors Global Research and Development Operations. Co-directors of the new research laboratory will be Professor Panos Y. Papalambros and Dr. Hazem Ezzat, head, Manufacturing and Design Systems Department and chief scientist, Delphi Saginaw Steering Systems.

Professor Albert B. Schultz and Senior Research Scientist James A. Ashton-Miller received

...and Research Activities

renewal of their National Institutes of Health Institute of Aging Program Project Grant. The five-year, $3.2 million grant funds “Fundamental Aspects of Mobility in Older Adults,” which includes three projects, “Multiple Impairments, Task Demands, and Mobility in Older Adults” (project leader: Neil B. Alexander, MD, a geriatrician in the Department of Internal Medicine, U-M Medical Center); “Physical and Psychological Factors in Mobility” (project leader: J. Ashton-Miller); and “Biomechanics of Falls and Fall Arrests in Older Adults” (project leader: A. Schultz).

Assistant Professor Liwei Lin received a three-year grant from the Defense Advanced Research Project Agency (DARPA) of the U.S. Department of Defense for developing a massively parallel micropackaging process to selectively encapsulate, trim, and adjust microelectromechanical (MEMS) devices. This project is in collaboration with Professor Kensall D. Wise in the Department of Electrical Engineering and Computer Science. Lin also received three NSF grants for developing MEMS post-packaging processes, MEMS sensors for disk/head contact interfacial problems, and integrated mesoscopic electromechanical manufacturing.
MEAM opened a new **Combustion and Synthesis Kinetics and Diagnostics Laboratory** under the direction of **Professor Arvind Atreya**, and **Associate Professor Volker Sick**. They are using a range of advanced laser-based diagnostics and computer simulations to investigate fundamental processes that are related to combustion, especially combustion-generated pollutants, combustion-assisted materials synthesis, chemical fire suppression, and sprays. The laboratory will also serve as a resource for the thermo-fluid science faculty and will be used for graduate student teaching in this area.

**The Center for Laser Aided Intelligent Manufacturing (CLAIM)** received funding to investigate the use of solid free-form fabrication or rapid prototyping to produce three-dimensional components with some of the most difficult engineering alloys to a significant degree of accuracy. **Professors Jyoti Mazumder** and **Noboru Kikuchi**, **Associate Professor Debasish Dutta**, and **Professor Amit Ghosh**, **Department of Material Sciences (MSE)**, will apply this technology to produce designed materials. Their work has the potential to revolutionize the field of solid free-form fabrication.

**The NSF Industry/University Cooperative Research Center (I/UCRC)** and **S.M. Wu Manufacturing Research Center (WuMRC)** created a new **stamping facility**, thanks to the leadership of the Auto Body Consortium, a group of industrial companies. The Minster Press Co. donated one of its state-of-the-art presses, fully equipped with advanced sensors and controllers contributed by the Helm Co., Data Instruments Co., Rockwell Allen-Bradley Co., and Alliance Co. gave an ōsmartō motor. Allen-Bradley also donated a second press with sophisticated die sets being made by General Motors Corp. In addition, Chrysler Corp. contributed materials analysis and testing equipment.

**The Automotive Research Center (ARC)**, under the leadership of **Professor Panos Y. Papalambros**, received renewal of its funding from the U.S. Army TARDEC National Automotive Center, with a five-year, $12.5 million grant.

Left and above: A new stamping facility with state-of-the-art presses was created at the S.M. Wu Manufacturing Research Center (WuMRC).

Professor Jyotirmoy Mazumder hosts External Advisory Board (EAB) members in the Center for Laser Aided Intelligent Manufacturing (CLAIM).
MEAM's External Advisory Board (EAB) continued to give substantive input and support to the Department during 1997–98. At its Spring meeting, MEAM welcomed new Board members Bronce Henderson, chairman and chief executive officer of DCT, Inc., Detroit, Michigan, and Michael Korybalski (BSE ME '69, MSE '73, MBA '80), chairman and chief executive officer of Mechanical Dynamics, Inc., Ann Arbor, Michigan.

MEAM expressed its deep appreciation to Kenneth K. Kohrs, who stepped down this year as EAB Chair. Kohrs, the founding chair of the EAB since its inception in 1993, has provided invaluable guidance and support to MEAM. He is vice president of the Large and Luxury Car Vehicle Center for Ford Motor Co., Dearborn, Michigan. EAB member Eugene De Fouw (BSE ME '69), president of the De Fouw Corp., in Camas, WA, succeeds Kohrs as EAB Chair.

MEAM Moves Forward

As MEAM experienced many exciting accomplishments during the 1997–98 school year, it continued to plan for future growth and development. It undertook an extensive Departmental Review, including input from an Internal Self-Assessment Committee and an External Review Committee. Both committees—whose members Robert J. Vlasic Dean of Engineering Stephen W. Director appointed—conducted interviews and surveys with faculty, staff, and students.

The Internal Self-Assessment Committee, comprised primarily of MEAM faculty, was formed in January 1998, and submitted an in-depth report of its findings and recommendations to the Dean and the CoE Executive Committee in June. The External Review Committee, which included representatives from other universities and industry, visited MEAM for two days in May 1998.

The Departmental Review coincided with the decision by MEAM Chair Panos Y. Papalambros not to continue as Chair for a third term. A MEAM Chair Search Committee was formed in December 1997. A new Chair is expected to be appointed by the Dean during the 1998–99 Academic Year.
MEAM gratefully acknowledges the contributors to our Department who support our ongoing quest for excellence. Their generous investment in MEAM allows us to continue to attract the very best faculty and students and to conduct groundbreaking research.

**Research Sponsors**

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University of Michigan Horace W. Rackham School of Graduate Studies
University of Michigan Office of the Vice President for Research (OVPR)
USCAR
Wayne State University / Greenfield Coalition / National Science Foundation (NSF)

**Research Expenditure Trends**

- $18,077,373
- $15,657,041
- $13,069,174
- $9,283,000
- $7,698,000
- $5,766,000
- $5,260,000
- $4,887,000
- $3,640,000
- $3,786,000

Corporate and individual gifts may be sent directly to:

MEAM / Univ of Michigan CoE
2250 GG Brown Lab
2350 Hayward St
Ann Arbor MI 48109-2125

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Our Mission of Excellence

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TRW Foundation
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Union Pacific Corporation
United Technologies Corp.
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Shih-Jean and Hsiang Wang
Andrew and Janet Warack
The Whitaker Foundation
Raymond I. Wilcox
Mr. and Mrs. Robert Woo
Thomas and Andrea Woo
Dr. Lucia Y. Yu
Chi and Lucy Yuan
Mr. and Mrs. William W. Yuan

New Research Funding Distribution by Source
$18.15 million
MEAM's partnerships with government and industry remain strong.

Total Expenditures Distribution by Use
$18.08 million
MEAM's research expenditures primarily support graduate education.
MEAM Student News

Student Leaders

Tricia Allam  Treasurer (F97), Pi Tau Sigma (ΠΤΣ/PTS).

Raegan Barnes  Secretary (97–98), American Society of Mechanical Engineers (ASME).

John Barrientos  UMEC/Undergraduate Representative (97–98), Underrepresented Minorities in Mechanical Engineering (UMME).

Fred Barrigar  Vice-President (97–98), Society of Automotive Engineering (SAE).

Christopher Clarke  President (97–98), Underrepresented Minorities in Mechanical Engineering (UMME).

Brian Forster  President (F97), Pi Tau Sigma (ΠΤΣ/PTS).

John Geis  Corresponding Secretary (F97); Vice President (W98), Pi Tau Sigma (ΠΤΣ/PTS).

Cathy Hedding  Treasurer (F97), American Society of Mechanical Engineers (ASME).

Michael Hitchingham  President (F97), American Society of Mechanical Engineers (ASME).

Ryan Kulcsar  Vice-President (97–98), American Society of Mechanical Engineers (ASME).

Michael McGuire  President (W98), American Society of Mechanical Engineers (ASME).

Jason Morris  Secretary (97–98), Underrepresented Minorities in Mechanical Engineering (UMME).

Jaime Roehrig  Vice President (F97); President (W98), Pi Tau Sigma (ΠΤΣ/PTS).

Ben Sabo  Treasurer (W98), Pi Tau Sigma (ΠΤΣ/PTS).

Shelly Sanborn  Secretary of Affairs (F97), Pi Tau Sigma (ΠΤΣ/PTS).

Justin Shriver  President (97–98), American Society of Engineering in Education (ASEE).

Doug Spearot  Corresponding Secretary (W98), Pi Tau Sigma (ΠΤΣ/PTS).

Nathan Stott  Secretary of Affairs (W98), Pi Tau Sigma (ΠΤΣ/PTS).

Hilary Wilson, Jr.  Vice-President (97–98), Underrepresented Minorities in Mechanical Engineering (UMME).

Michael Yeaster  Treasurer (W98), American Society of Mechanical Engineers (ASME).
Undergraduate Student Scholarships and Awards

Amoco Foundation Inc. Scholarship
Rachel Bautista

David Aspland Scholarships
McAllister Daniel, Jr.
David S. Fedewa
Michael J. Forbes
William B. Kasiske

Mildred and Steele Bailey Prize
Rahul Tendulkar

William J. Bandemer Scholarships
Amy D. Derault
Jennifer A. Gruits
Jennifer E. Krause
Elizabeth E. Oatley

Charles Barth, Jr. Prize
Nader Shwayhat

Carlos R. and Gloria W. Bell Scholarship
Daniel J. Giszczak

Boeing Scholarship
April M. Nelson

Joseph Boyer Scholarship
Mari Endo

Carl A. and Isabelle M. Brauer Scholarship
Michael R. Farina

Budd Student Aid
Michelle Hahn

J.A. Bursley Prize
Amy Van Loon

Robert M. Caddell Memorial Undergraduate Scholarship
Robert W. Brown

Chrysler Corporation Engineering Scholarships
Tricia M. Allam
Benjamin P. Bulat
Carolyn Dodge

CoE Class of 1931 Scholarships
Jason M. DeWeerd
Timothy J. Jacobs
Meenakshi Jain
Andrew Leuthesser

CoE Class of 1939 Scholarship
Fernando Jimenez

CoE Distinguished Achievement Awards
Gustavo Freitag (dual degree, Aerospace Engineering)
Jeffrey Sanko

CoE Opportunity Grants
Jeremiah Gray
Kristopher Hall
Fernando Jimenez
Jason A. Morris

CoE and Scholarship Aid
Michelle C. Carpenter
Benjamin D. Libert

Lawrence D. Corlett Scholarship
Roberto A. Franco

John Deere Award
Nicolas Minbiole

Cornelius and Margaret Donovan Scholarships
Tom B. Campbell
Erin L. Worrall

Dow Chemical Scholarships
Giuseppe Cusumano
Timothy J. Jacobs

Richard Earhart Scholarship
John P. Barrientos

Cathy Hedding (BSE ME ’98) demonstrates her team’s Conservation of Energy project at the ME 450 Senior Design Expo in April 1998.
Henry Ford II Prize
Suzanne Volkman

General Motors
Corporation Scholarships
Michelle Hahn
Timothy J. Jacobs
Michelle L. Sanborn
Adam M. Szymczak

Herbert J. and Mabel M. Goulding Scholarship
Timothy Wittrock

Clarence E. Groesbeck Memorial Scholarships
Jeffrey M. Aneiros
Constantine D. Hatzis
Ryan P. Schrieber

Gene Hirs Scholarship
Brandy M. Taylor

Hiller H. Horton Scholarship
Kevin Storch

Eveleen Harriet Hunt Scholarship
Phillip H. Kang

Information Handling Service (IHS) Scholarship
Jeffrey Sanko

Donald B. Kennedy Engineering Scholarship
Isma'il D. Curtis

Martin Luther King, Jr. Spirit Awards
Roberto Franco
Jaime Roehrig
Rahul Tendulkar
Hilary Wilson

Simon Madlebaum Scholarship
Arthur Galdres

Constance B. Mathias Scholarship
Daniel T. Herrera

McDonnell Douglas Scholarship
Michael Arciniega

MEAM Distinguished Student Award
Jeffrey Sanko

George H. Miller Memorial Scholarships
Amy Caiazza
David A. Depto
Albert J. Geldres
David S. Hsai
Jay D. Russell

Minnesota Mining and Manufacturing (3M) Scholarship/Internships
Justina Cho, Junior
Jaime Roehrig, Senior

A.D. Moore Award
Jonathan Weinert

Ralph Murphy Engineering Scholarship
Matthew M. Abbott

Burke E. Porter Foundation Scholarship
Christopher Leja

1997–98 R&B Machine Tool Company Scholar
Gregory Benz

Hugh Rumler Prize
Dapak D’Souza

Howard W. and Ruth Hoff Sheldon Scholarships
Jason A. Morris
Rodrigo A. Murua
Rafael Tejada

Arthur B. Singleton Prize
Yunn-Shing Ong

Society of Women Engineers (SWE) Outstanding Female Senior Engineer Award
Michelle L. Sanborn

Special Engineering Scholarships (Industry)
Adam R. Cole
Edward T. Downs
Anastasios (John) Hart
Michael Hitchingham
Timothy J. Jacobs
Sandeep Khattar
Jason Lee

General University Scholarships–Engineering
Raegan R. Barnes
Sari M. Bernal
Larry R. Berryhill
Bruno M. Bomis
Daniel S. Czach
Christopher L. Demoff
Katherine L. Eggleton
Michael P. Furmanek
Kevin T. Hatch
Richard R. Hofer
Ross Hunefeld
Ryan M. Külcsér
Kevin Kwiatkowski
Peter S. Lazarevski
Ana Malusev
Amy S. Meyers
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Chat (William) Picken
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Aleta Sutterfield
Janet L. Swanson
John Swanson
Rafael Tejada
Alicia Vogel
Stuart M. Welden

Jay Wetzel Quality Scholarship for Excellence
Jaime Roehrig

From left, MEAM students, Roberto Franco, Jaime Roehrig, Hilary Wilson, Kathryn Laberteaux, and Rahul Tendulkar, received CoE 1998 Martin Luther King, Jr., Spirit Awards.
**Graduate Student Scholarships and Awards**

- American Society for Engineering Education (ASEE), Student Chapter Outstanding Graduate Student Instructor Award: Amir Oliveira
- Automobile & Transportation Interiors Award: Andrew Argersinger
- Robert M. Caddell Memorial Graduate Student Research Achievement Award: Yankei Wang
- National Science Foundation (NSF) Traineeships: Matthew Bono, Chad Darr, Eric Endsley, Jorge Sandoval, Michele Tokarz
- Rackham Engineering Fellowships: Paul Alexander, Bjorn Christensen, Cin-Young Lee
- Rackham Merit Fellowships: Sean Berhan, Charles Hoffter, Daphne Joachim, Nnaemeka Nwosu, Jorge Sandoval, Paris von Lockette
- Rackham Outstanding Teaching Assistant Awards: Amir Oliveira, Elizabeth Smith
- Rackham Pre-Doctoral Fellowships: Apoorva Agarwal, Kathryn Laberteaux
- Regents Fellowships: Michael Brewer, James Driscoll IV, William Jarvis
- Col. Jess G. Vincent Fellowship: Devon Ferreira
- Whirlpool Fellowship: Brian Roed

**Student Enrollment**

![Graph showing student enrollment](image)

**Enrollment and Degrees Granted**

Numbers do not include students jointly enrolled in ME and other disciplines.

**Enrollment: Fall 1997**
- Doctor of Philosophy: 194
- Master of Science in Engineering: 110
- Bachelor of Science: 506
- Total: 810

- Doctor of Philosophy: 35
- Master of Science in Engineering: 102
- Bachelor of Science: 180
- Total: 317
Doctoral Degrees Conferred

Fall (December) 1997

ABDULHAMID AL-ABDULJABBAR
Effects of Pressure Sensitivity on Notch-Tip Fields in Plastics.
Chair: J. Pan.

DONG-WOON BAI
Chair: K.C. Ludema.

WALID EMILE HABIB
Chair: A.C. Ward.

YU-CHING HOU
Fatigue and Fracture Analyses of Automotive and Welded Structures.
Chair: J. Pan.

JOOSANG KIM
Effect of Plastic Deformation on the Oxidation Rate of Steel.
Chair: K.C. Ludema.

SIGURD A. NELSON II
Chair: P.Y. Papalambros.

GEORGE CHRISTOS PAPAGEORGAKIS
Turbulence Modeling of Gaseous Injection and Mixing in DI Engines.
Chair: D.N. Assanis.

JAEIL SUN
Chair: A. Atreya.

DEREK MICHAEL YIP-HOI
Methodologies for Computer-Aided Process Planning for Parallel Machining.
Chair: D. Dutta.

Winter (May) 1998

LAURINE LEEP APOILONI
Computations of Unsteady Pressure in Fluid Flows for Acoustic Analyses.
Chair: D.R. Dowlings.

EDWARD PAUL BECKER
An Empirical Model of Cylinder Bore Wear Developed by Simulation.
Chair: K.C. Ludema.

SUN-WEN CHENG
Cavitation and Hysteresis Phenomena in Oil Flow through a Rotating Shaft with Radial Exit Branches.
Chair: W.-J. Yang.

HANBUM CHO
Dynamic Stability of Frictional Slip.
Chair: J.R. Barber.

JAEOON HAN
Numerical Studies of Drop Motion in Axisymmetric Geometry.
Co-Chairs: S.L. Cuccio, G. Tryggvason.

TZE-ON SHAWN HUI

PRASHANT M. KULKARNI
Process Planning for the Layer Domain of Layered Manufacturing.
Chair: D. Dutta.

M. J. LEAMY
Influence of Dry Friction in the Dynamic Response of Accessory Belt Drive System.
Co-Chairs: J.R. Barber, N.C. Perkins.

CHUAN LI
Thermoelastic Contact Stability Analysis.
Co-Chairs: J.R. Barber, M.M. Chen.

HSING-SHENG LIANG
Nucleate Pool Boiling on Micro-Graphite-Fiber Composite Surfaces with Applications in Microelectronic Cooling.
Chair: W.-J. Yang.

ARNALDO JOE MAZZEI, JR.
Dynamic Stability of a Flexible Spring Mounted Shaft Driven through a Universal Joint.
Co-Chairs: A. Argento, R.A. Scott.

PETER JOSEPH SCHIHL
Development of Global Mixing, Combustion, and Ignition Models for Quiescent Chamber Direct-Injection Diesel Engines.
Chair: A. Atreya.

JONGMIN SHIN
A Numerical Study on Turbulent Flow and Heat Transfer in Flow Networks.
Chair: W.-J. Yang.

FUU-REN TSAI
Vision Sensing, Modeling, and Control of Laser Weld Pool Geometry.
Chair: E. Kannatey-Asibu, Jr.

YENKAI WANG
Mixed-Mode Fracture in Ductile Materials and Low-Cycle Multiaxial Fatigue Theory.
Chair: J. Pan.

JUN ZHANG
 Constitutive Modeling and Optimal Design of Polymeric Foams for Crashworthiness.
Co-Chairs: N. Kikuchi, V.C. Li.
Spring/Summer (August) 1998

APOORVA AGARWAL
Multi-Dimensional Modeling of Natural Gas Ignition, Combustion and Pollutant Formation in Direct Injection Engines.
Chair: D.N. Assanis.

E-JUNE CHEN
Analysis of Crescent Former Paper Manufacturing.

HAN-KYOO KIM
A Study of NOx Production in Sooty Radiating Counterflow Diffusion Flames.
Chair: A. Atreya.

SHYUE-YIH LEU
A Finite-Element Limit Analysis for Materials with Pressure Dependent Yield Behavior.
Chair: W.-H. Yang.

WEN-HOU MA
Chair: H. Peng.

JAIROM MANJUNATHAIAH
Analysis and a New Model for the Orthogonal Machining Process in the Presence of Edge-Radiused (Non-Sharp) Tools.
Chair: W.J. Endres.

SHINJI NISHIWAKI
Optimum Structural Topology Design Considering Flexibility.

AMIR ANTONIO MARTINS OLIVEIRA
Chair: M. Kaviany.

EMILIO CARLOS SILVA
Chair: N. Kikuchi.

Above: Students, like John Dockstader, spend many hours in the MEAM student machine shops. Below: Professor and outgoing Department Chair, Panos Y. Papalambros, talks with future graduate students at the Winter Term 1998 MEAM Prospective Graduate Student Weekend.
Faculty and Staff News

New Instructional Faculty

Volker Sick
Associate Professor (effective 09-01-97), received his doctor of natural sciences (Dr. rer. nat.) degree at the Physical Chemistry Institute of the University of Heidelberg in Germany in 1992. He most recently served as a senior research scientist at the Physical Chemistry Institute in Germany, where he was also the head of the 2D imaging research group. His primary research area focuses on the quantitative analysis of technical combustion processes using laser-based diagnostic techniques.

New Primary Research Staff

Ho Sung Lee
Assistant Research Scientist (effective 09-01-97), formerly a MEAM Research Investigator.

Mostafa (Moses) G. Mehrabi
Assistant Research Scientist (effective 01-01-98), formerly a MEAM Visiting Research Investigator.

Derek Michael Yip-Hoi
(PhD '97) Assistant Research Scientist (effective 01-21-98), formerly a MEAM Research Fellow.

Promotions

FACULTY

Jun Ni
Associate Professor with tenure, to Professor with tenure (effective 09-01-97).

Christophe Pierre
Associate Professor with tenure, to Professor with tenure (effective 09-01-97).

Grétar Tryggvason
Associate Professor with tenure, to Professor with tenure (effective 09-01-97).

Jingxia Yuan
Assistant Research Scientist, to Associate Research Scientist (effective 09-01-97).

STAFF

Susan Clair
Office Assistant IV, to Administrative Assistant II (effective 01-01-98).

Pam Fitzgerald
Academic Secretary IV, to Executive Secretary (effective 12-01-97).

Murrie Green
Engineering Technician II, to Engineering Technician III (effective 01-01-98).

Maribel Munguia
Academics Services Secretary III, to Academic Secretary IV (effective 05-01-98).

Mike Napolitan
Office Assistant IV, to Coordinator, Building Services (effective 01-01-98).
Retirements

Faculty

Kenneth C. Ludema  (BSE IE ’55, MSE ’56, PhD ’63) Professor, retired (effective 05-31-99) from the MEAM faculty after a distinguished career spanning 35 years as an excellent educator and leading scholar in the field of tribology. He has received several awards, including the 1993 Tribology Gold Medal by the International Tribology Council and MEAM’s 1995 Excellence in Research Award. He is the co-author of Manufacturing Engineering: Economics and Processes, and the author of the newly released, Friction, Wear, and Lubrication: A Textbook in Tribology.

Staff

Duncan Kaufmann  Engineering Technician II, retired after almost twelve years of service with MEAM (effective 01-31-99).

Beverly Pyle  Academic Secretary III, retired after almost 29 years of service with MEAM (effective 05-01-99).

Professor Kenneth C. Ludema’s latest research in tribology focuses on the dynamics of film growth on sliding parts in engines, films which form from the special constituents in oil and allowing an engine to last well beyond 200,000 miles.
Faculty and Staff Honors

Faculty Honors

DIONISSIOS (DENNIS) N. ASSANIS
Professor, received the 1997 Interna
tional Combustion Engineering Division
Meritorious Service Award from the
American Society of Mechanical
Engineers (ASME).

JAMES A. ASHTON-MILLER
Research Scientist, received the
American Urogynecology Society
(AUS) Best Paper Award for 1997
for his paper, “Patterns of Age-
Related Striated Urogenital
Sphincter Muscle Loss in the Adult
Female Urethra,” and the
Wissenschafterpreis Award of the
German Urogynecology Society,
1997 Annual Meeting, Munich,
Germany, for his paper “Morphologic
Changes in the Striated Urogenital
Sphincter Muscle,” co-authored with
D. Perucchi, J.O.L. DeLancey, and
M. Blaivas.

JAMES R. BARBER, C. ENG
Professor, was co-recipient of the
1998 A.F. Davis Silver Medal Award
(Structure Design) from the American
Welding Society (AWS), with E.
Kannatey-Asibu, Jr. He gave the
plenary lecture “Thermoelastic Insta-
Bilities in Brakes and Clutches,” at
the 28th National Conference of
Italian Association for Stress Analysis

JOHANN BORENSTEIN
Associate Research Scientist, was
awarded the Discover Magazine Award
for Technological Innovation.

CLAUDE BORONAKKE
Associate Professor, was selected by the
Michigan (Gamma) Chapter of Tau Beta Pi (TBP)
set to be their first
Professor of the Year.

STEVEN L. CECCIO
Associate Professor, shared the
Best Paper Award from the Mechani
cal Engineering Division of the
American Society for Engineering
Education (ASEE) for 1998 with
G. Tryggvason and D.M. Tilbury.

DARIUSZ (DAREK) J. CEGLAREK
Assistant Research Scientist, was
named a Dell K. Allen Outstanding
Young Manufacturing Engineer for
1998 by the Society of Manufacturing
Engineers (SME).

DAVID E. COLE
Research Scientist, UMTRI; and Joint
Appointment as Associate Professor,
MEAM, received the 1998 Rene
Dubos Environmental Award.

MARIA COMMINOU
Professor, was the recipient of the
1998 Sarah Goddard Power Award.

DEBASISH DUTTA
Associate Professor, was a keynote
speaker at the Eighth International
Manufacturing Conference,

WILLIAM J. ENDRES
Assistant Professor, received a
1997-98 National Science
Foundation (NSF) CAREER Award,
as well as the Blackwell Machine Tool
and Gage Award from the American
Society of Mechanical Engineers
(ASME-MED). He was also recog-
nized as an Outstanding Reviewer
of the Year by the ASME Journal of
Manufacturing Science and Engineering.

RITA T. FAROUKI
Professor, was named Professor-of-
The-Year by Pi Tau Sigma (ITTA/PTS)
for the Winter Term of 1998.

ELIJAH KANNATEY-ASIBU, JR.
Professor, was co-recipient of the
1998 A.F. Davis Silver Medal Award
(Structure Design) from the American
Welding Society (AWS), with
J.R. Barber.

BRUCE H. KARNOFF
Associate Professor, continued as an
Arthur F. Thumau Professor

Yoram Koren, PE
Professor, had his endowed profes-
sorship renewed as the Paul G.
Goebel Professor of Engineering

SRIDHAR KOTA
Associate Professor, won the
American Society of Mechanical
Engineers (ASME) Leonardo da Vinci
Award for 1997.

LIWEI LIN
Assistant Professor, received a
1997-98 National Science Foundation
(NSF) CAREER Award (ECS Div-
ision).

JYOTIRMOK (JYOTI) MAZUMDER
Professor, continued his U-M CoE
endowed professorship as the
Robert H. Lurie Professor of

JWON PANG
Associate Professor, was elected a
Fellow of the American Society of
Mechanical Engineers (ASME),

HUEI PENG
Assistant Professor, received a
1997-98 National Science Founda-
ton (NSF) CAREER Award.

CHRISTOPHE PIERRE
Professor, was selected as a Fellow,
Committee on Institutional Cooperation,
Academic Leadership Program
(CIC/ALP), Sept. 1997.

ANN MARIE SAISTRY
Assistant Professor, was presented
the National Science Foundation
(NSF) Presidential Early Career
Award for Scientists and Engineers
(PECASE) in Washington, D.C.,
Nov. 1997. She was the keynote
speaker at the WISE Symposium of
the Committee on Institutional

ALBERT B. SCHULTZ
Professor, continued his endowed professorship as the Vennema
Professor of Mechanical Engineering and Applied Mechanics (1983-open).
Richard A. Scott
Professor, received the Best Paper Award from the Noise Control and Acoustics Division at the 1997 International Mechanical Engineering Congress and Exposition (IMECE), Dallas, TX, Nov. 1997.

Volker Sick
Associate Professor, was elected Fellow of the Institute for Environmental Sciences, Engineering, and Technology (ISET) at U-M, June 1998. He was awarded the title "Privatdozent" from the University of Heidelberg, Germany.

Michael Thouless
Associate Professor, was named Pi Tau Sigma (IIT2/PTS) Professor-of-the-Term for Fall 1997.

Dawn M. Tilbury
Assistant Professor, was awarded the American Society of Mechanical Engineers (ASME) Educom Medal for 1997. She also shared the Best Paper Award from the Mechanical Engineering Division of the American Society for Engineering Education (ASEE) for 1998 with S.L. Ceccio and G. Tryggvason.

Gretar Tryggvason
Professor, shared the Best Paper Award from the Mechanical Engineering Division of the American Society for Engineering Education (ASEE) for 1998 with S.L. Ceccio and D.M. Tilbury. Tryggvason also was the invited plenary lecturer at the 11th Japanese Computational Fluid Dynamics Conference, Tokyo, Japan, Dec. 1997.

A. Galip Ulsoy
Professor, had his endowed professorship renewed as the William Clay Ford Professor of Engineering (1996–98; 1998–01). He was awarded the Service Excellence Award by the College of Engineering for 1998.

Wen-Jei Yang, PE
Professor, was named an Honorary Member by the Combustion Institute of the Republic of China and elected a Fellow of the Visualization Society of Japan, 1998.

Staff Honor
Janet Grenier
Supervisor, Laboratory Services, was a recipient of a CoE 1998 Excellence in Staff Service Award, June 1998.
MEAM Departmental Awards

Alumni Society Merit Award

WILLIAM P. SOMMERS (BSE ME ’55, ME ’56, PhD ’61), President and Chief Executive Officer of SRI International, for his contributions in the areas of research, development, and management over the last 40 years. MEAM applauds his expertise in world-wide technology commercialization projects, consulting, and stimulating new areas of cross-disciplinary research between engineering and medicine. He is a former research associate with U-M’s Institute of Science and Technology (IST) and a former member of the CoE’s National Advisory Committee (NAC).

Excellence in Service

DAVID E. COLE (BSE ME ’60, BSE M ’60, MSE ’61, PhD ’66) Research Scientist, UMTRI; and Joint Appointment as Associate Professor, MEAM, for the outstanding outreach activities of the Office for the Study of Automotive Transportation (OSAT), and his annual Management Briefing Seminars. He brings great national and international recognition to the Department, College, and University through his authoritative comments on the scientific and cultural issues of the automotive industry.

DONALD E. GEISTER (BS AA ’57, MSE Aero ’63) Research Scientist and Lecturer, Aerospace Engineering; and Joint Appointment as Lecturer, MEAM, for his seminal contributions to the development of computer and information technology at the Department, College, and University. For 25 years, he has been a guiding force in keeping our Department on the technological leading edge. At the same time he has been a mentor and teacher to a generation of students and researchers in design, manufacturing, and instrumentation.

Special Recognition

STEVEN A. GOLDBEIN (MS ’77, PhD ’81) Professor, Orthopaedic Surgery, Medical School; Joint Appointment as Professor, MEAM; Joint Appointment as Professor, Biomedical Engineering; and Joint Appointment as Research Scientist, Institute of Gerontology, for his internationally acclaimed research in tissue engineering, the relationships between bone and soft tissues, and other orthopaedic biomechanical phenomena. His laboratory and technology transfer outreach program continually attracts the highest caliber of researchers.

Robert M. Caddell Memorial Award

S. JACK HU (MSE ’86, PhD ’90) Associate Professor, received the Faculty Research Achievement Award.

Excellence in Staff Service

MICHAEL NAPOLITAN Coordinator of Building Services, for his exemplary support service to the faculty, staff, and students of the Department of Mechanical Engineering and Applied Mechanics.

DIANNE VAN HOOSER Academic Secretary III, for her exemplary support service to the faculty, staff, and students of the Department of Mechanical Engineering and Applied Mechanics.

Excellence in Teaching

DIONISSIOS (DENNIS) N. ASSANIS Professor, for his outstanding teaching of combustion, fluid mechanics, and heat transfer at both the undergraduate and graduate levels.

DAWN M. TILBURY Assistant Professor, for her pioneering development of Web-based learning techniques in control systems education.

KEY TO DEGREES NOTED:
U-M–Ann Arbor degrees are listed;
MEAM alumni’s degrees are boldfaced.
For brevity's sake, this list omits Departmental, College, and University of Michigan activities for the faculty and does not include their technical review contributions to authoritative journals and agencies.

ELLEN M. ARRUDA

JAMES A. ASHTON-MILLER

DIONISSIOS (DENNIS) N. ASSANIS


ARVIND ATREYA

JAMES R. BARBER, C ENG

CLAUSS BORGNAKKE

DIANN E. BREI

STEVEN L. CECCIO

DARIUSZ (DAREK) J. Ceglarek

MICHAEL M. CHEN

DAVID E. COLE

MARIA COMMINOU

DAVID R. DOWLING
DEBASISH DUTTA

WILLIAM J. ENDRES

ROBERT D. ERVIN
Research Referee: Public Good Science Fund of New Zealand. Coordinating Council Member: ITSA.

RIDA T. FAROUKI

DONALD E. GEISTER
Chair: Greenfield Coalition, Focus: HOPE. Committee Member: Greenfield Coalition Systems and Methodology.

STEVEN A. GOLDSTEIN

KARL GROSH

SCOTT J. HOLLISTER

GREGORY M. HULBERT
Editor: ASME-PVP Newsletter. Associate Editor: Mech's. of Structures and Machines. Editorial Board Member: Finite Elements in Analysis and Design. Committee Vice-Chair: Computing in Appl. Mechs., SWE-AM; Computer Technology, ASME-PVP.

ELIJAH KANNATEY-ASIBU, JR.
Executive Committee Chair: ASME-ME.

MASSOUD KAVIANI

NOBORU KIKUCHI

YORAM KOREN, PE

SRIDHAR KOTA

LIWEI LIN

KENNETH C. LUDEMA

JYOTIRMoy (JYoti) MArumDeR
Editor-in-Chief: J. Laser Application. Editorial Board Member: AIP, Board of Governors Member: LIA. Advisory Board Member: Lasers and Electro-Optics, Chapman and Hall.

DAVID W. MEAD

HERMAn MERTe, JR., PE

JUN Ni
JWO PAN
Associate Editor: ASME J. Pressure Vessel and Technology.
Committee Member: Fracture Mech., ASME, 1995–present;
Metallic Mater., ASME-MAT, 1996–present; Fabrication and Maters., ASME-PVP, 1996–present;

PANOS Y. PAPALAMBROS
Editorial Board Member:
Board of Directors Member: R&B Machine Tool Co., 1997–98.

NOEL C. PERKINS
Associate Technical Editor:
Editorial Board Member: J. Vibration and Control.
Committee Member: Honors and Awards, ASME.

CHRISTOPHE PIERRE
Associate Editor: ASME J. Vibration and Acoustics, 1992–present.
Advisory Board Member: ASMED, 1994–present.
Committee Member: Structures and Dynamics, Intl. Gas Turbine Inst.; and Subcommittee Chair, Honors and Awards, ASME.

ANN MARIE SASTRY
Symposium Organizer and Chair: Symp. on "Durability and Damage
Committee Member: Composites, ASME-MAT; Composite Maters., ASME-AM.

ALBERT B. SCHULTZ

WILLIAM W. SCHULTZ
Faculty Advisor: Student Chapter, ASME, 1995–present.

VOLKER SICK
The Eidgenossische Technische Hochschule: Zurich, Switzerland, May 1998, as part of an invited visit by ERCOTAC, a Eur. research collaboration.

JEFFERY L. STEIN, PE

MICHAIL THOULESS

DAWN M. TILBURY

GRÉTAR TRYGGVASON

A. Galip Ulsoy

ALAN S. WINEMAN

XIN WU
Deputy Technical Director: Near Zero Stamping Program, NIST-STP. Member: Autobody Consortium.
<table>
<thead>
<tr>
<th>Name</th>
<th>Design and Manufacturing</th>
<th>Dynamics, Systems and Controls</th>
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<tr>
<td>Akhatov, Barry S.</td>
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<td>Arapci, Vedat S.</td>
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<td>Assaad, Dennis N.</td>
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<td>Bergkamp, Claus</td>
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<td>Berk, Daniel E.</td>
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<td>Bridges, Michael M.</td>
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<td>Ceccon, Steven J.</td>
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<td>Efstratis, William J.</td>
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<td>Fardows, Rida T.</td>
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<td>Holmen, John W.</td>
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<td>Hu, S. Jack</td>
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<td>Huhlen, Gregory M.</td>
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<td>Kanaan-Ahlu, E.J., Elijah</td>
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<td>Kappes, Bruce H.</td>
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<td>Ludman, Kenneth C.</td>
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<td>Mead, David W.</td>
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<td>Meyer, Jr., Herman</td>
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<td>Smith, George E.</td>
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<td>Tilbury, Dawn M.</td>
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<td>Yang, Wen-Ji</td>
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</table>

● Active in the field, conducts research, teaches courses, contributes papers.
○ Interested in the field, small research grants, sometimes teaches courses.
# MEAM Primary Research Scientists, Joint Appointments, and Adjunct Faculty

## 1997–1998

### Research Scientists

<table>
<thead>
<tr>
<th>Name</th>
<th>Design and Manufacturing</th>
<th>Dynamics, Systems and Controls</th>
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<tbody>
<tr>
<td>Ahmadi, M.</td>
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<td>Borko, J.</td>
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<td>Carlevaro, J.</td>
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<td>Lee, H. K.</td>
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<td>Mehrabi, M.</td>
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<td>Zhang, H.</td>
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</table>

### Joint Appointments

#### Professors
- Cole, D. E.
- Goldstein, S. A.
- Jacobs, S. J.
- Taylor, J. E.

### Research Scientist
- Enr. R. D.

### Lecturer
- Geihsy, D. E.

### Adjunct Appointments

#### Professors
- Gillies, T. D.
- Malon, D. E.
- Orlandeau, N. V.

#### Research Scientists
- Kuepper, F.
- Segall, S. B.
- Upton, M.
- Ward, A. C.

#### Lecturer
- Leon, H.

*Active in the field, conducts research, teaches courses, contributes papers.*

*Interested in the field, small research grants, sometimes teaches courses.*
### MEAM Primary Research Scientists, Joint Appointments, and Adjunct Faculty

**1997–1998**

<table>
<thead>
<tr>
<th>RESEARCH SCIENTISTS</th>
<th>Materials and Solid Mechanics</th>
<th>Thermal and Fluid Sciences</th>
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<tbody>
<tr>
<td>Adlani-Miller, James A.</td>
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<td>Berenson, Johann</td>
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<td>Cartier, Matthew B.</td>
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<td>Cheung, Darrell J.</td>
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<td>Eren, David A.</td>
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<td>Filip, Zoran S.</td>
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<td>Landers, Robert G.</td>
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<td>Lee, Ho Sung</td>
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<td>Lu, Zheng-Dong</td>
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<td>Mehrotra, Mostafa</td>
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<td>Michelsen, Nestor F.</td>
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<td>Wu, Xin</td>
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<td>Yip-Hui, Derek</td>
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<td>Yuan, Jingxia</td>
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<td>Zhang, Hongshen</td>
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<tr>
<td>Cole, David E.</td>
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<td>Goldstein, Steven A.</td>
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<td>Hollis, Scott J.</td>
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<td>Jacobs, Stanley J.</td>
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<td>Taylor, John E.</td>
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<td>Ervin, Robert D.</td>
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<td>Geiser, Donald E.</td>
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<td>Gillepsie, Thomas D.</td>
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<td>Milen, Donald E.</td>
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<td>Orluenda, Nicolae V.</td>
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<td>Kueper, Frank</td>
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<td>Sagall, Stephen B.</td>
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<td>Upham, Juris</td>
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<td>Ward, Alan C.</td>
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<td>Lenz, Heinz</td>
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</table>

*○* Active in the field, conducts research, teaches courses, contributes papers.

*○* Interested in the field, small research grants, sometimes teaches courses.
1997 Faculty Publications


CONFERENCE PROCEEDINGS


Dynamics, Systems and Controls

Area Coordinator: A. Galip Ulsoy
Contributing Faculty: James A. Ashton-Miller; James R. Barber, C. Eng; Johann Borenstein; Michael M. Bridges; Matthew P. Castanier; Steven L. Ceccol; Robert D. Enin; Thomas D. Gillespie, PE; Steven A. Goldstein; Karl Gross; Scott J. Hollister; Gregory M. Hubert; Yoram Koren; Arthur D. Ku; Zhong-Dong Ma; Hui Peng; Noel C. Perkins; Christophe Pierre; Albert B. Schultz; William W. Schultz; Richard A. Scott; Jeffrey L. Stein, PE; Dawn M. Tilbury; Grzegor Tryggvason; A. Galip Ulsoy; Alex S. Wineman; Hongyan Zhang.

JOURNAL ARTICLES


BOOK CHAPTERS


**CONFERENCE PROCEEDINGS**


Materials and Solid Mechanics

Area Coordinator: John Holmes
Contributing Faculty: Ellen M. Arunda; James R. Barber, C Eng; Michael M. Chen; Joseph Gatto (emeritus); John W. Holmes; Gregory M. Hubert; Eljah Kamrany-Ashour, Jr.; Noboru Kikuchi; Kenneth C. Ludema; Zheng-Dong Ma; Jyotirmoy (Jyo) Mazumder; Jwo Pan; Christophe Pierre; Ann Marie Sastry; and Michael Thouless; Alan S. Wineman; Wei-Hsun Yang.

JOURNAL ARTICLES


BOOK CHAPTERS


**CONFERENCE PROCEEDINGS**


Books


Thermal and Fluid Sciences

Area Coordinator: Dionisos (Dennis) N. Anassis
Contributing Faculty: Rayhanah Akhavan; Vedat S. Arpaci; Dionisos (Dennis) N. Anassis; Avind Atreya, Claus Borgnakke; Steven L. Cecco; Michael H. Chen; David R. Dowling; David A. Everett; Zoran S. Filip; Stanley J. Jacobs; Massoud Kaveh; Robert B. Keller (emeritus); Ho Sung Lee; Herman Mertie, Jr., PE; Donald J. Patterson, PE (emeritus); Noel C. Perkins; William W. Schults; Volker Sick; Richard E. Sonntag; Grétar Tryggvason; Wen-Jie Yang, PE.

JOURNAL ARTICLES


Mehrdad Kaviani
Stanley J. Jacobs

Heinrich Merte, Jr., PE
William W. Schultz

Volker Sick
Gene E. Smith

Richard E. Sonntag
Gretter Tryggvason

Wan-Jiel Yang, PE


CONFERENCE PROCEEDINGS


**Book Chapters**


**Books**


Appendix: Acronyms Key

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIAA</td>
<td>American Institute of Aeronautics and Astronautics</td>
</tr>
<tr>
<td>AIAS</td>
<td>Italian Association for Stress Analysis</td>
</tr>
<tr>
<td>AIP</td>
<td>American Institute of Physics</td>
</tr>
<tr>
<td>ASA</td>
<td>Acoustical Society of America</td>
</tr>
<tr>
<td>ASCE</td>
<td>American Society of Civil Engineers</td>
</tr>
<tr>
<td>ASEE</td>
<td>American Society for Engineering Education</td>
</tr>
<tr>
<td>ASME</td>
<td>American Society of Mechanical Engineers</td>
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<tr>
<td>IEEE</td>
<td>International Institute of Electrical and Electronics Engineers, Inc.</td>
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<tr>
<td>ITSA</td>
<td>Intelligent Transportation Society of America</td>
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<tr>
<td>LACEA</td>
<td>Laser Applications for Chemical and Environmental Analysis</td>
</tr>
<tr>
<td>LIA</td>
<td>Laser Institute of America</td>
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<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
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<tr>
<td>NAC</td>
<td>National Automotive Center</td>
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<tr>
<td>NAE</td>
<td>National Academy of Engineering</td>
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<tr>
<td>NIST</td>
<td>National Institute of Standards and Technology</td>
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<tr>
<td>NSF</td>
<td>National Science Foundation</td>
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<tr>
<td>ONR</td>
<td>Office of Naval Research</td>
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<tr>
<td>OSA</td>
<td>Optical Society of America</td>
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<td>ΠΣΤΣ/ΠΣ Α</td>
<td>Pi Tau Sigma</td>
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<tr>
<td>SAE</td>
<td>Society of Automotive Engineers</td>
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<td>SES</td>
<td>Society of Engineering Science</td>
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<td>SIAM</td>
<td>Society of Industrial and Applied Mathematics</td>
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<td>SME</td>
<td>Society of Manufacturing Engineers</td>
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<tr>
<td>SOR</td>
<td>Society of Rheology</td>
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<tr>
<td>SPE</td>
<td>Society of Plastics Engineers</td>
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<td>AUS</td>
<td>American Urological Society</td>
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<tr>
<td>AWS</td>
<td>American Welding Society</td>
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<tr>
<td>CIRP</td>
<td>International Institution of Production Engineering Research (non-English acronym)</td>
</tr>
<tr>
<td>IESET</td>
<td>Institute for Environmental Sciences, Engineering, and Technology</td>
</tr>
<tr>
<td>IACM</td>
<td>International Association for Computational Mechanics</td>
</tr>
<tr>
<td>ICLASS</td>
<td>International Conference on Liquid Atomization and Spray Systems</td>
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<tr>
<td>ANTEC</td>
<td>Annual Technical Conference</td>
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<tr>
<td>SPIE</td>
<td>Society of Photo-Optical Instrumentation Engineers, International Society for Optical Engineering</td>
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<tr>
<td>TBP</td>
<td>Tau Beta Pi</td>
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<tr>
<td>TMI</td>
<td>Tauber Manufacturing Institute</td>
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<tr>
<td>WISE</td>
<td>Women in Science and Engineering</td>
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<tr>
<td>WuMRC</td>
<td>S.M. Wu Manufacturing Research Center</td>
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Credits

Executive Editors  Panos Y. Papalambros, A. Galip Ulsoy
Editors            Anna Babitto, Shelinah Errington
Writer             Laurie Barnett
Graphic Design     Shelinah Errington
Printer            White Pine Inc., Ann Arbor, Michigan

COVER PHOTOS

Outside Back Cover (I. to r.): U.S. Senator Spencer Abraham at the dedication of the Integrated Manufacturing Systems Laboratory (IMSL): Professor Christophe Pierre greets prospective graduate students: North Campus in springtime.

photo credits: U-M MEAM CFO / Shelinah Errington

Outside Front Cover (I. to r.): External Advisory Board (EAB) members. from left: Eugene A. De Fouw, Roger L. McCarthy, and Kenneth K. Kohrs (seated); J.W. Rosow, marshall, leads WS8 undergraduates at the May CoE commencement.

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David Smith Photography

Inside Back Cover: U-M North Campus scenes.
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University of Michigan
College of Engineering
Mechanical Engineering
and Applied Mechanics
2250 GG Brown Bldg
2350 Hayward St
Ann Arbor, Michigan 48109-2125
734 764-2894
734 647-3170 fax
http://www.engin.umich.edu/dept/mea

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and Katherine E. White, Ann Arbor