

## **Hasan U. Akay**

*Chancellor's Professor of Mechanical Engineering  
Interim Associate Dean for Academic Programs and Research  
Purdue School of Engineering and Technology  
Indiana University-Purdue University Indianapolis (IUPUI)  
<http://www.engr.iupui.edu/~hakay>*

### **Education**

- 1974, Ph.D., Civil Engineering, University of Texas at Austin, Austin, Texas.
- 1969, M.S., Civil Engineering, University of Texas at Austin, Austin, Texas.
- 1967, B.S., Civil Engineering, Middle East Technical University, Ankara, Turkey.

### **Positions Held at IUPUI**

- 2008-Present, Interim Associate Dean for Academic Programs and Research
- 2003-Present, Chancellor's Professor of Mechanical Engineering.
- 2000-2008, Chair, Department of Mechanical Engineering.
- 2004-Present, Director, Multidisciplinary Undergraduate Research Institute (MURI), Purdue School of Engineering and Technology.
- 2007-Present, Member of Executive Committee, Richard G. Lugar Center for Renewable Energy.
- 1985-Present, Professor of Mechanical Engineering.
- 1981-1985, Associate Professor of Mechanical Engineering.
- 1980-1981, Research Associate of Mechanical Engineering.

### **Other Related Experience**

- 1985-Present, Technical Consultant, Technalysis, Inc., Indianapolis, IN, 1985-Present.
- 1979-1980, Associate Professor of Civil Engineering, Middle East Technical University, Ankara, Turkey.
- 1978-1980, Assistant Chair of Civil Engineering, Middle East Technical University, Ankara, Turkey.
- 1974-1979, Assistant Professor of Civil Engineering, Middle East Technical University, Ankara, Turkey.

### **Teaching Interests**

Finite elements, computational methods, basic mechanics, solid mechanics, and fluid mechanics.

### **Courses Taught at IUPUI**

*ME 262 Mechanical Design I, ME 270 Basic Mechanics I, ME 272 Mechanics of Materials, ME 310 Fluid Mechanics, ME 450 Computer-Aided Engineering Analysis, ME 509 Intermediate Fluid Mechanics, ME 550 Advanced Stress Analysis, ME 551 Finite Element Analysis, ME 552 Advanced Applications of Finite Element Method.*

## Research Interests

Computational fluid dynamics, computational solid dynamics, finite element and finite volume methods, parallel computing, solid-fluid interactions, fatigue and creep modeling, electronic package reliability. Development of multi-scale computational models for active materials.

## General Summary

Dr. Akay has over thirty years of research and teaching experience in the development of computational algorithms for solution of multiphysics problems, including the development of parallel and dynamic load balancing algorithms for large-scale problems with broad range of applications in fluid mechanics, heat transfer, electromagnetics, and solid mechanics; as well as high-performance grid computing, solid-fluid interactions, computational aeroelasticity, and multi-scale simulations. His primary activities in these areas include research, teaching, development, and technical consulting. Dr. Akay has been a consultant to various organizations on the utilization of computational methods, including finite element and finite volume codes he has developed. He has published numerous journal and conference papers and book chapters (over 160) and presented lectures at various national and international conferences. He has been involved with the large-scale computational and parallel grid computing research at the Computational Fluid Dynamics (CFD) Laboratory of the Department of Mechanical Engineering at IUPUI for over twenty years and more recently with the research and administration of the recently established Richard G. Lugar Center for Renewable Energy at IUPUI. He has conducted numerous research projects funded by various government and private agencies. He is a Fellow Member of the American Society of Mechanical Engineers (ASME), Senior Member of the American Institute of Aeronautics and Astronautics (AIAA), and Member of the American Society of Engineering Education (ASEE).

## Recent Projects

1. Development of computational fluid dynamics models for improving performance of pharmaceutical isolators. Funded by Eli Lilly and Co., \$283,542, March 2004-May 2008. The developed models are to be used for advancing the company's drug manufacturing processes.
2. Development of parallel CFD algorithms for multidisciplinary applications on the TeraGrid, including parallel rendering of solutions on the TeraGrid.
3. Parallel solution of fluid-structure interaction problems via coupling of fluid dynamics (CFD) and solid dynamics (CSD) codes for aeroelastic flutter predictions.
4. Founding directorship of the IUPUI Multidisciplinary Undergraduate Research Institute (MURI, [www.muri.iupui.edu](http://www.muri.iupui.edu)), a campus-funded program designed to provide multidisciplinary research and team-work opportunities for talented undergraduates and attract them to graduate studies.

## Principal Publications (recent)

### Journal Papers

1. N. Nayan, H.U. Akay, M.R. Walsh, W.V. Bell, G.L. Troyer, R.E. Dukes, and P. Mohan, "CFD Modeling of Pharmaceutical Isolators with Experimental Verification of Airflow," *PDA J. Pharmaceutical Science and Technology*, pp. 237-254, 2007.
2. J. Koh, A.T. Hsu, H.U. Akay, and M.F. Liou, "Analysis of Overall Heat Balance in Self-Heated Proton-Exchange-Membrane Fuel Cells for Temperature Predictions," *Journal of Power Sources*, No. 144, pp. 122-128, 2005.
3. M. Pikal, S. Chen, and H.U. Akay, "Glass Transition Models in Freeze Drying," *Pharmaceutical Development and Technology*, Vol. 10, No. 1, pp 17-32, 2005.
4. R.M. Pidaparti, P.W. Longest, A.T. Hsu, and H.U. Akay, "Nanoscale Computational Analysis for an Idealized Bio-molecular Motor," *Bulletin of the Polish Academy of Sciences, Technical Sciences*, Vol. 53, No. 4, 2005.
5. E. Oktay, H.U. Akay, and A. Uzun, "A Parallelized 3D Unstructured Euler Solver for Unsteady Aerodynamics," *AIAA Journal of Aircraft*, Vol. 40, No. 2, pp. 348-354, 2003.
6. H.U. Akay, Y. Liu, and M. Rassaian, "Simplification of Finite Element Models for Thermal Fatigue Life Prediction of PBGA Packages," *ASME Journal of Electronic Packaging*, Vol. 125, pp. 347-353, 2003.
7. E. Yilmaz, M.S. Kavsoglu, H.U. Akay, and I.S. Akmandor, "Cell-vertex Based Parallel and Adaptive Explicit 3D Flow Solution on Unstructured Grids," *International Journal of Computational Fluid Dynamics*, Vol. 14, pp. 271-286, 2001.
8. Y.P. Chien, A. Ecer, H.U. Akay, S. Secer, and J.D. Chen, "Cost Estimation for Parallel CFD Using Variable Time-Stepping Algorithms," *International Journal of Computational Fluid Dynamics*, Vol. 15, pp. 183-195, 2001.
9. S. Kocak and H.U. Akay, "Parallel Schur Complement Method for Large-Scale Systems on Distributed Memory Computers," *Journal of Applied Mathematical Modeling*, Vol. 25, pp. 873-886, 2001.
10. Y.P. Chien, A. Ecer, H.U. Akay, S. Secer, and R. Blech, "Communication Cost Estimation for Parallel CFD Using Variable Time-Stepping Algorithms," *Computer Methods in Applied Mechanics and Engineering*, Vol. 19, pp. 1379-1389, 2000.
11. A. Ecer, N. Gopalaswamy, H.U. Akay, and Y.P. Chien, "Digital Filtering Techniques for Parallel Computation of Explicit Schemes," *International Journal of Computational Fluid Dynamics*, Vol. 13, pp. 211-222, 2000.
12. H.U. Akay, A. Ecer, and K. Fekete, "A Semi-Explicit Parallel Solver for Viscous Incompressible Flows," *Computer Methods in Applied Mechanics and Engineering*, Vol. 151, pp. 1-12, 1998.
13. N. Gopalaswamy, A. Ecer, H.U. Akay, and Y.P. Chien, "Efficient Parallel Communication Schemes for Explicit CFD Solvers," *AIAA Journal*, pp. 961-967, 1998.

14. H.U. Akay, N.H. Paydar, G. Glogas, and H. Zhang, "Viscoelastic Study of a Conductive Adhesive for Electronic Packages – Part 1: Experimental Determination of Material Properties," *International Journal of Microelectronic Packaging*, Vol. 1, pp. 217-224, 1998.
15. H.U. Akay, N.H. Paydar, G. Glogas, and H. Zhang, "Viscoelastic Study of a Conductive Adhesive for Electronic Packages – Part 2: Thermal Stress Analysis Using the Finite Element Method," *International Journal of Microelectronic Packaging*, Vol. 1, pp. 225-233, 1998.
16. H.U. Akay, N.H. Paydar, A. Bilgic, "Fatigue Life Predictions for Thermally Loaded Solder Joints Using a Volume-Weighted Averaging Technique," *ASME Journal of Electronic Packaging*, Vol. 119, pp. 228-235, 1997.

#### **Conference Proceedings (Teaching)**

1. H.U. Akay and K.J. Wilson, "IUPUI Multidisciplinary Research Undergraduate Institutes (MURI)," *The 12<sup>th</sup> CUR National Conference*, St. Benedict College, Saint Joseph, MN, June 21-24, 2008.
2. J. Chen and H.U. Akay, "Capstone Design Course: A Bridge to the Real World Engineering," *National Capstone Design Course Conference 2007*, Boulder, Colorado, June 13-15, 2007.
3. G.M. Malacinski, H. Yokota, and H.U. Akay, "Integrating the Traditionally Trained Mechanical Engineer (Problem-Solver) into Modern Medical Research Projects," *Proceedings of the Spring 2007 American Society for Engineering Education Illinois-Indiana Section Conference*, Indianapolis, Indiana, March 30-31, 2007.
4. R.M. Pidaparti and H.U. Akay, "ME Curriculum Redesign Through an Assessment Process," *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, Salt Lake City, Utah, June 20-23, 2004.

#### **Conference Proceedings/Book Chapters (Research)**

1. H.U. Akay, R. Payli, J. Liu, and Akin Ecer, "An Overset Unstructured Grid Method for Parallel Solvers," *Parallel CFD 2009*, NASA Ames Research Center, Moffett Field, CA, May 18-22, 2009.
2. E. Oktay, O. Merttopcuoglu, C. Sener, A. Ketenci, and H.U. Akay, "Parallel Shape Optimization of a Missile on a Grid Infrastructure," *Parallel CFD 2008*, Lyon, France, May 19-22, 2008.
3. E. Yilmaz, R.U. Payli, H.U. Akay, A. Ecer, and J. Liu, "Scalability Considerations of a Parallel Flow Solver on Large Scale Computing Systems," *Parallel CFD 2008*, Lyon, France, May 19-22, 2008.
4. S. Chien, G. Makinabakan, A. Ecer, and H.U. Akay, "Dynamic Load Balancing on Windows Based Multi-core PCs," *Parallel CFD 2008*, Lyon, France, May 19-22, 2008.
5. E. Oktay, O. Merttopcuoglu, and H.U. Akay, "An Approach for Parallel CFD Solutions of Moving Boundary Problems," *Parallel CFD 2007*, Edited by I.H. Tuncer, et al., Springer-Verlag, pp. 393-400, 2009.

6. R.U. Payli, E. Yilmaz, H.U. Akay, and A. Ecer, "Impact of the TeraGrid on Large-Scale Simulations and Visualizations" *Parallel CFD 2007*, Edited by I.H. Tuncer, et al., Springer-Verlag, 2009, pp. 409-415, 2009.
7. E. Yilmaz, R.U. Payli, H.U. Akay, and A. Ecer, "Hybrid Parallelism for CFD Simulations: Combining MPI with OpenMP," *Parallel CFD 2007*, Edited by I.H. Tuncer, et al., Springer-Verlag, pp. 401-408, 2009.
8. S.Y. Chien, G. Makinabakan, A. Ecer, and H.U. Akay, "Parallel Computing on Network of Windows Based PCs," *Parallel CFD 2007*, Springer-Verlag, Edited by I.H. Tuncer, et al., pp. 155-162, 2009.
9. E. Yilmaz, R. Payli, H.U. Akay, and A. Ecer, "Efficient Distribution of a Parallel Job Across Different Grid Sites." *Parallel CFD 2006*, Edited by J.H. Kwon, Elsevier Science, 2007, pp. 107-114.
10. S.Y. Chien, G. Makinabakan, A. Ecer, H.U. Akay, "Non-Intrusive Information Collection for Load Balancing of Parallel Applications," *Parallel CFD 2006*, Edited by Edited by J.H. Kwon, Elsevier Science, 2007, pp. 147-154.
11. R.U. Payli, H.U. Akay, A.S. Baddi, E. Yilmaz, A. Ecer, and E. Oktay, "Computational Fluid Dynamics Applications on TeraGrid," *Parallel CFD 2005*, Edited by A. Deane, et al., Elsevier Science, 2006, pp. 141-148.
12. S. Chien, L. Giavelli, A. Ecer, and H.U. Akay, "Distributed Scheduler with Dynamic Load Balancing for Heterogeneous Computers," *Parallel CFD 2005*, Edited by A. Deane, et al., Elsevier Science, 2006, pp. 413-420.
13. H.U. Akay, A. Baddi, and E. Yilmaz, "Large-Scale Parallel Computations of Fluid-Solid Interaction Problems for Aeroelastic Flutter Predictions," *AIAC-2005-002, Ankara International Aerospace Conference, Ankara, Turkey, August 22-25, 2005*.
14. R.U. Payli, E. Yilmaz, A. Ecer, H.U. Akay, and S. Chien, "DLB – A Dynamic Load Balancing Tool for Grid Computing," *Parallel CFD 2004*, Edited by G. Winter, et al., Elsevier Science, pp. 387-394, 2005.
15. S.Y. Chien, L. Giavelli, A. Ecer, and H.U. Akay, "Security Considerations in the Distributed Parallel Computation Environment," *Parallel CFD 2004*, Edited by G. Winter, et al., Elsevier Science, pp. 395-402, 2005.
16. E. Yilmaz, A. Ecer, H.U. Akay, R.U. Payli, S. Chien, and Y. Wang, "Parallel Computing in Grid Environment," *Parallel CFD 2003*, Edited by B. Chetverushkin, et al., Elsevier Science, pp. 293-300, 2004.
17. S. Chien, Y. Wang, A. Ecer, and H.U. Akay, "Grid Scheduler with Dynamic Load Balancing for Parallel CFD," *Parallel CFD 2003*, Edited by B. Chetverushkin, et al., Elsevier Science, pp. 259-266, 2004.
18. H.U. Akay, E. Oktay, X. He, and R.U. Payli, "A Code Coupling Application for Solid-Fluid Interactions and Parallel Computing," *Parallel CFD 2003*, Edited by B. Chetverushkin, et al., Elsevier Science, pp. 393-300, 2004.
19. K.B. Mehta, H.U. Akay, W.G. Walkington, and R. Holland, "A Case Study for Simulation-Based Improvements in Dimensional Accuracy of Die-Cast Parts," *22<sup>nd</sup> International Die Casting Congress and Exposition*, September 15-18, 2003.

20. H.U. Akay, E. Oktay, Z. Li, and X. He, "Parallel Computing for Aeroelasticity Problems," *21<sup>st</sup> AIAA Applied Aerodynamics Conference*, Orlando, FL, June 23-26, 2003.
21. H.U. Akay and E. Oktay, "Parallel Adaptivity for Solution of Euler Equations Using Unstructured Solvers," *Proceedings of Parallel CFD'02*, Edited by K. Matsuno, et al., Elsevier Science, pp. 371-378, 2003.
22. E. Yilmaz, A. Ecer, H.U. Akay, and S. Chien, "Reaching Equilibrium for Non-Cooperative Dynamic Load Balancing Applications," *Proceedings of Parallel CFD'02*, Edited by K. Matsuno, et al., Elsevier Science, pp. 215-222, 2003.
23. E. Oktay, H.U. Akay, and A. Uzun, "A Parallelized 3D Unstructured Euler Solver For Unsteady Aerodynamics," AIAA Paper: 2002-0107, 40<sup>th</sup> Aerospace Sciences Meeting, Reno, NV, January 14-17, 2002.
24. E. Oktay and H.U. Akay, "CFD Predictions of Dynamic Derivatives for Missiles," AIAA Paper: 2002-0276, 40<sup>th</sup> Aerospace Sciences Meeting, Reno, NV, January 14-17, 2002.
25. Y.P. Chien, J.D. Chen, A. Ecer, H.U. Akay, and J. Zhou, "DLB 2.0 – A Distributed Environment Tool for Supporting Balanced Execution of Multiple Parallel Jobs on Networked Computers," *Parallel CFD 2001 – Theory and Practice*, Edited by P. Wilders, et al., Elsevier Science, 2002.
26. E. Yilmaz, H.U. Akay, M.S. Kavsaoglu, and I.S. Akmandor, "Parallel and Adaptive 3D Solution Using Unstructured Grids," *Parallel CFD 2000 - Trends and Applications*, Edited by C.B. Jenssen, et al., Elsevier Science, pp. 533-542, 2001.
27. T. Bonich, J.D. Chen, A. Ecer, Y.P. Chien, and H.U. Akay, "Dynamic Load Balancing in International Distributed Heterogeneous Workstation Clusters," *Parallel CFD 2000 - Trends and Applications*, Edited by C.B. Jenssen, et al., Elsevier Science, pp. 217-224, 2001.
28. Y.P. Chien, J.D. Chen, A. Ecer, and H.U. Akay, "Computer Load Measurements for Parallel Computing," *Parallel CFD 2000 - Trends and Applications*, Edited by C.B. Jenssen, et al., Elsevier Science, pp. 183-190, 2001.
29. A. Uzun, H.U. Akay, and C. Bronnenberg, "Parallel Computations of Unsteady Euler Equations on Dynamically Deforming Unstructured Grids," *Parallel CFD '99*, Edited by D. Keyes, et al., Elsevier Science, pp. 415-422, 2000.
30. S. Kocak and H.U. Akay, "An Efficient Storage Technique for Parallel Schur Complement Method and Applications on Different Platforms," *Parallel CFD '99*, Edited by D. Keyes, et al., Elsevier Science, pp. 281-288, 2000.
31. Y.P. Chien, J.D. Chen, A. Ecer, and H.U. Akay, "Dynamic Load Balancing for Parallel CFD on NT Networks," *Parallel CFD '99*, Edited by D. Keyes, et al., Elsevier Science, pp. 165-172, 2000.
32. H.U. Akay, A. Ecer, E. Yilmaz, and L.P. Loo, "Dynamic Load Balancing Applications on Heterogeneous Unix and NT Clusters," *Proceedings of European Congress on Computational Methods in Applied Sciences and Engineering*, Barcelona, Spain, September, 11-14, 2000. Invited Paper.
33. A. Ecer, Y.P. Chien, H.U. Akay, and J.D. Chen, "Load Balancing for Multiple

- Parallel Jobs,” *Proceedings of European Congress on Computational Methods in Applied Sciences and Engineering*,” Barcelona, Spain, September 11-14, 2000. Invited Paper.
34. A. Ecer, Y.P. Chien, J.D. Chen, T. Boenisch, and H.U. Akay, “Dynamic Load Balancing for Distributed Heterogeneous Computing of Parallel CFD Problems,” *Computational Aerosciences Workshop*, February 15-17, 2000.
  35. H.U. Akay, G. Kaliappan, N. Paydar, and M. Rassaian, “A Study of Fatigue Life Predictions for PBGA Joints and Comparisons with Test Data,” *ASME Advances in Electronic Packaging*, InterPACK’99, Edited by D. Agonafer, et al., *ASME, EEP-Vol. 26-1*, pp. 677-684, 1999. Invited paper.
  36. H.U. Akay, A. Uzun, and C. Bronnenberg, “A Parallel 3D Euler Solver for Unsteady Aerodynamics,” *Proceedings of Parallel CFD Workshop ’99*, Istanbul Technical University, Istanbul, Turkey, June 16-18, 1999. Invited paper.
  37. A. Ecer, N. Gopalaswamy, H.U. Akay, and Y.P. Chien, “Digital Filtering Techniques for Parallel Computation of Explicit Schemes,” *AIAA Paper 98-0616*, *36th Aerospace Sciences Meeting and Exhibit*, January 12-15, 1998, Reno NV.
  38. S. Kocak, H.U. Akay, and A. Ecer, “Parallel Implicit Treatment of Interface Conditions in Domain Decomposition Algorithms,” *Parallel Computational Fluid Dynamics ’98*, Elsevier Science, 1998.
  39. H.U. Akay, A. Ecer, and K. Fekete, “A Domain Decomposition Based Parallel Solver for Viscous Incompressible Flows,” *Parallel Computational Fluid Dynamics ’97*, Edited by A. Ecer, et al., Elsevier Science, The Netherlands, 1998.
  40. A. Ecer, N. Gopalaswamy, H.U. Akay, and Y.P. Chien, “Efficient Parallel Computing Using Digital Filtering Algorithms,” *Parallel Computational Fluid Dynamics ’97*, Edited by A. Ecer, et al., Elsevier Science, The Netherlands, 1998.
  41. Y.P. Chien, S. Secer, A. Ecer, and H.U. Akay, “Communication Cost Function for Parallel CFD Using Variable Time Stepping Algorithms,” *Parallel Computational Fluid Dynamics ’97*, Edited by A. Ecer, et al., Elsevier Science, The Netherlands, 1998.

### Invited Lectures

1. “Program Assessment Process in the Department of Mechanical Engineering,” *Presented to the Ph.D. Class of Dr. Trudy Banta (a renowned international expert in Assessment)*, IUPUI, June 5, 2007.
2. “Computational Science and Engineering (CSE) Programs,” *EDUCEE Workshop*, Bahcesehir University, Istanbul, Turkey, October 4-6, 2006.
3. “Large-Scale Parallel Computations of Solid-Fluid Interaction Problems for Aeroelastic Flutter Predictions,” *Ankara International Aerospace Conference*, August 22-25, 2005, Middle East Technical University, Ankara, Turkey.
4. “Challenges in Parallel and Distributed Computing of CFD Problems,” *ASME Congress, Applied Mechanics Session*, Anaheim, CA, November 15, 2004.
5. “Continuous Program Assessment in the Department of Mechanical Engineering, IUPUI,” *Presented to the Ph.D. Class of Dr. Trudy Banta (a renowned international expert in Assessment)*, IUPUI, May 27, 2003.

6. "Metacomputing of Solid-Fluid Structure Interaction Problems via I-Light," *I-Light Applications Workshop*, IUPUI, December 4, 2002.
7. "Parallel Computational Fluid Dynamics and Dynamic Load Balancing on Heterogeneous Computer Clusters," *Mechanical Engineering Seminar Series*, Rice University, February 27, 2002, Houston, TX.
8. "Documenting Progress on Assessment," *2001 Assessment Institute*," IUPUI, November 6, 2001, Indianapolis, IN.
9. "Simplification of Finite Element Models for Thermal Fatigue Life Prediction of PBGA Packages," *Electronic Packaging Symposium, ASME Annual Meeting*, November 11-16, 2001, New York.
10. "Parallel Computational Fluid Dynamics Research at IUPUI," *Wright Patterson Air Force Base, Multidisciplinary Research Group*, March 21, 2001, Dayton, Ohio.
11. "Dynamic Load Balancing Applications on Heterogeneous Unix and NT Clusters," *European Congress on Computational Methods in Applied Sciences and Engineering*, Barcelona, Spain, September, 12, 2000.
12. "Parallel Computing for Large Scale Computational Fluid Dynamics," *Department of Physics Seminar Series*, IUPUI, February 3, 2000.

#### **Graduate Students Supervised (recent)**

1. Promyoo Rapeepan, *Ph.D.*, "Development of Multiscale Computational Algorithms for Surface Reacting Materials." In progress.
2. Jingxin Liu, *Ph.D.* (member of advisory committee), "Simulating Unsteady Flow of Moving Flow and Control Valves by an Unstructured Overset Grid Method." December 2008.
3. Cai Shen, *MSME*, Thesis: "CFD Models for Flow and Mass Transfer of Hydrogenperoxide in Pharmaceutical Isolators." December 2008.
4. Cem Ersungur, *MSME*, Thesis: "Kinetic Monte Carlo Molecular Simulations for Fuel Cell Applications and Surface Reactions." August 2007.
5. Amit Baddi, *MSME*, Thesis: "Parallel Computations of Solid-Fluid Interactions Problems." December 2005.
6. Xiaoyin He, *MSME*, Thesis: "Parallel Computations of Solid-Fluid Interactions Using Arbitrary Lagrangian-Eulerian and Relative Coordinate Formulations," IUPUI, May 2004.
7. Zhenyin Li, *MSME*, Thesis: "Parallel Computations of 3D Unsteady Compressible Euler Equations with Structural Coupling," IUPUI, August 2002.
8. Yan Liu, *MSME*, Thesis: "Simplified 2D/3D Models for Fatigue Life Prediction of BGA Solder Joints of Electronic Packages," IUPUI, August 2001.
9. Christoffer Bronnenberg, *MSME*, Thesis: "An Unstructured Grid Partitioning Program For Parallel Computational Fluid Dynamics," IUPUI, August 1999.
10. Ali Uzun, *MSME*, Thesis: "Parallel Computations of Unsteady Euler Equations on Dynamically Deforming Unstructured Grids," IUPUI, August 1999.
11. Jamie Workman, *MSME*, Thesis: "3D Unstructured Grids for Unsteady Compressible Flows," IUPUI, August 1999.

12. Gunasekaran Kaliappan, MSME, Thesis: “*A Comparative Evaluation of Fatigue Life Prediction Methods for Solder Joint Assemblies,*” IUPUI, May 1999.
13. Hongyan Zhang, MSME, Thesis: “*Combined Heat Transfer and Thermal Stress Analysis of Power Resistor Assemblies for Fatigue Life Predictions,*” IUPUI, May 1998.
14. Karoly Fekete, MSE, Thesis: “*A Domain Decomposition Based Parallel Solver for Incompressible Navier-Stokes Equations Using the Finite Element Method,*” IUPUI, August 1997.

### **Principal Research Projects (recent)**

1. “*Development of Computational Fluid Dynamics Models for Improving Performance of Pharmaceutical Isolators, Phases 1 and 2*” Eli Lilly and Company, \$207,407, 4/04-8/07, Principal Investigator.
2. “*Multi-Scale Methodology for the Design of Active Materials,*” Indiana 21st Century Research and Technology Fund, \$573,000, 9/03-8/05, Co-Principal Investigator.
3. “*Parallelization and Development of Solid-Fluid Interaction Models for Aeroelasticity,*” Aeronautical Engineering Department, Middle East Technical University, \$57,507, 8/99-12/02, Principal Investigator.
4. NASA Glenn Research Center, “*Dynamic Load Balancing on Heterogeneous Systems,*” \$200,000, 9/99-9/00, Co-investigator.
5. “*Establishment of a Parallel Network of IBM RS/6000 Computers at the CFD Laboratory,*” IBM Corporation, \$152,730, 12/98-12/99, Co-principal Investigator.
6. “*Methods for Improving the Efficiency of Heterogeneous Parallel Computation of Internal Flows,*” NASA Lewis Research Center, \$240,000, 11/97-10/00. Co-principal Investigator.
7. “*Benchmarking of FEA Capabilities for Structural Analysis,*” \$59,000, 3/98-3/99, \$59,000, Raytheon Technical Services, Principal Investigator.
8. “*Prediction of Fatigue Life of Solder Joints Under Thermal Loads,*” \$41,006, 5/96-4/97, United Technology/Carrier Electronics, Principal Investigator.

### **Membership in Scientific and Professional Societies**

1. Fellow Member, American Society of Mechanical Engineers (ASME).
2. Member, American Institute of Aeronautics and Astronautics (AIAA).
3. Member, American Society of Engineering Education (ASEE).
4. Member, North American Die-Casting Association (NADCA).

### **Honors and Awards**

1. Director’s Award for Distinguished Mentor, Center for Research and Learning, IUPUI, 2007
2. 2004, Elected Fellow, ASME.
3. 2003, Chancellor’s Professor of Mechanical Engineering.

4. 2002, Dorris H. Merritt Outstanding Leadership Award, School of Engineering and Technology, IUPUI.
5. 1999, Dean's Special Award for Distinguished Contributions to the School.
6. 1997, TERA Teaching Excellence Recognition Award, IUPUI.
7. 1993 Abe Max Distinguished Professor Award, School of Engineering and Technology.

## **Significant Institutional Service**

### ***Campus Level***

1. Director, Multidisciplinary Undergraduate Research Institute, IUPUI, 2005-Present.
2. Chair, IUPUI Faculty Council Technology Committee, 2004-Present.
3. Chair, IUPUI International Development Funds Advisory Committee, 2004-Present.
4. Member, Program Review Committee for IUPUI Computer Science Department, 2006.
5. Member, Executive Committee, Richard G. Lugar Center for Renewable Energy, 2007-Present
6. Member, Board of Directors, IUPUI Center for Undergraduate Research and Learning, 2004-Present.
7. Member At Large, IUPUI Faculty Council, 2002-2004 and 2006 – Present.
8. Member, IUPUI Faculty Grievance Advisory Panel, 2004-Present.
9. Member, IUPUI Future Group, 2001-2003.
10. Chair, IUPUI Faculty Council Budgetary Affairs Committee, 2000-2002.
11. Member, IUPUI Faculty Council Budgetary Affairs Committee, 2003.
12. Chair, CSCI and ECE Joint Curriculum Committee, 2003-2004 (an ad hoc committee formed by IUPUI administration).

### ***School Level***

1. Chair, Computing Resources Committee, 2005-Present.
2. Chair, Faculty Affairs Committee, 2004 (member, 2002-Present).
3. Member, Joint IUPUI/Purdue Committee for Establishing Engineering Ph.D. Programs at IUPUI, 2003.
4. Chair, Budgetary Affairs Committee, 2002-2004.
5. Member, Dean of Engineering and Technology Review Committee, 2002.
6. Member, Unit Promotion and Tenure Board, 1986-2007 (elected or appointed).
7. Chair, Constitution and Bylaws Committee. 1994-1998 (member, 2000-Present)
8. Chair, Tenure and Promotion Workshops, 1997, 1999, 2003, and 2005.

### ***Department Level***

1. Chair or Member, ME Graduate Committee, 1990-2000.
2. ME Department Representative, Purdue School of Mechanical Engineering Graduate Committee, West Lafayette, 1998-2000.

3. Chair, Primary Committee, 1990-Present.
4. Chair or Member, Search and Screen Committees including the search committee for department chair, computer-aided design, thermal science, and biomedical faculty positions, 1990-2000.

### **Significant Professional Service (recent)**

#### ***Editorial Boards***

1. Member of Editorial Board, International Journal of Computational Fluid Dynamics, 1990-Present.
2. Member of Editorial Board, International Journal for Computational Methods in Engineering Science and Mechanics, 2003-Present

#### ***Journal Reviews***

1. ASME Journal of Electronic Packaging.
2. Computer Methods in Applied Mechanics and Engineering.
3. International Journal of Computational Fluid Dynamics.
4. International Journal International Journal for Computational Methods in Engineering Science and Mechanics.
5. International Journal of Computers and Fluids.
6. International Journal for Numerical Methods in Engineering
7. International Journal for Numerical Methods in Fluids.

#### ***Conferences***

1. Session Chair and Paper Presenter. *Parallel Computational Fluid Dynamics Conference*, Moscow, Russia, May 12, 2003.
2. Session Chair and Invited Paper Presenter, *Electronic Packaging Symposium, ASME Annual Meeting*, New York, NY, November 13, 2001.
3. *Session chair and presenter. European Congress on Computational Methods in Applied Sciences and Engineering*, Barcelona, Spain, September 12, 2000.
4. *Session chair and presenter. Parallel CFD Workshop '99, Istanbul Technical University*, Istanbul, Turkey, June 17, 1999.
5. *Session chair and presenter. Parallel Computational Fluid Dynamics Conference '99*, Williamsburg, VA, May 25, 1999.
6. *Session chair and presenter. ASME Advances in Electronic Packaging Conference, InterPACK'97*, Kohala Coast, Hawaii, June 15-19, 1997.

#### ***Others***

1. Offered a short course for an engineering design group of Crane Naval Surface Warfare Center, Crane, IN, titled "Advanced Applications of the Multiphysics Finite Element Program ANSYS," on January 4-9, at IUPUI, Indianapolis.

### **Significant Professional Development Activities (recent)**

1. Participant, *ASME Mechanical Engineering Education Conference*, April 11-15, 2004, Clearwater Beach, FL.

2. Participant, *ASME Mechanical Engineering Education Conference*, April 7-10, 2002, Clearwater Beach, FL.
3. Participant, *ABET Preparedness Workshops*, November 11, 2001 and March 5, 2004.
4. Participant, *ABET Regional Engineering Faculty Workshop*, September 23-24, 2000, Newton, IO.