

Abani Kumar Patra

Department of Mechanical & Aerospace Eng.
University at Buffalo
Buffalo, NY 14260-4400

Tel: 716-645-2593 x2240
Fax: 716-645-3875
email: abani@eng.buffalo.edu

on leave 2007-08 at

Office of Cyberinfrastructure
National Science Foundation
Arlington, VA 22230

Tel: 703 292 8970
email:apatra@nsf.gov

Research Interests

Large scale scientific computing and computational mathematics, Adaptive *hp* Finite Element Methods, Parallel Iterative Solvers, Discontinuous Galerkin Finite Element Methods, Domain Decomposition and Preconditioners, Data Management for Scientific Computing, Parameter uncertainty propagation methods, Applications to Geophysical Mass flows and simulations of Biomechanical Systems

Education

Ph.D.	University of Texas-Austin Austin, TX	1995	Computational and Applied Mathematics ¹
M.S.	University of Missouri-Rolla Rolla, MO	1990	Mechanical Engineering
B.E. (Hons.)	Birla Institute of Technology and Sciences Pilani, India	1987	Mechanical Engineering

Ph.D. Thesis: Parallel *hp* Adaptive Finite Elements For Viscous Incompressible Flows

M.S. Thesis: Finite Element Analysis of Flexible Mechanisms

Employment History

01/07–present Program Director Office of Cyberinfrastructure, National Science Foundation.

06/04– present Professor Department of Mechanical and Aerospace Engineering, University at Buffalo, State University of New York

06/01 – 05/04 Associate Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo, State University of New York

¹Interdisciplinary program with participation from engineering, mathematics and computer science.

- 01/96 – 05/01 Assistant Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo, State University of New York
- 06-95 – 12/95 NSF Post Doctoral Fellow University of Texas-Austin, Austin., TX: researched parallel *hp* adaptive finite element methods for viscous, incompressible 3D flows
- 02/93 – 12/95 Manager TICAM Computing Laboratory manager and administrator for computational laboratory supporting 50 users
- 06/91 – 05/95 Research Assistant University of Texas-Austin, Austin., TX, employed on DARPA project “Optimal Computational Strategies For Computational Fluid Dynamics”
- 08/90 – 05/91 Teaching Assistant University of Texas at Austin, Assisted in teaching Strength of Material classes
- 08/88 – 05/90 Teaching Assistant University of Missouri at Rolla, Taught courses on Control Systems Laboratory and Materials Testing Laboratory
- 07/87 – 06/88 Engineer, Tata Engineering And Locomotive Company, Bombay, India.

Honors and Awards

- Recognized as a top 100 Federal Grantee, at University at Buffalo, 2002
- Awarded National Science Foundation CAREER² Award, 1997-2002
- Awarded National Science Foundation Post-doctoral Fellowship, 1995
- Awarded First Ph.D. from Computational and Applied Mathematics Program at University of Texas-Austin 1995
- Placed eighth out of approximately ten thousand in School Certificate Examination, Orissa, India
- Awarded National Talent Scholarship by the Government of India, 1981-87
- Awarded Riefler Award School of Engineering and Applied Sciences, UB, 1998,1999

Professional Service

- Co-organizer of mini-symposium “HPC Applications in Computational Mechanics” at VIIIth World Congress on Computational Mechanics, June 2008.
- Co-organizer of mini-symposium “Towards Petascale Application Development” at IXth US National Congress on Computational Mechanics, June 2007.

²“The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation’s most prestigious awards in support of the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century” – www.nsf.gov.

- Co-editor of special issue on "Modeling and Simulation" for Journal of Volcanology and Geothermal Research Vol 139 (2005) Issue 1-2.
- Organizing or co-organizing mini-symposia at major national and international meetings:
 - Mini-symposium on "Infrastructures for Computational Mechanics" at VIIIth US National Congress on Computational Mechanics, 2005
 - Mini-symposium on "Large Scale Granular Flows" at Xth SIAM Computational Science and Engineering, 2003.
 - Mini-symposium on "Performance Portable Applications and Library Development" at Xth SIAM Parallel Processing Conference, 2001.
 - Mini-symposium on "Parallel Adaptive Mesh Refinement Schemes" at IXth SIAM Parallel Processing Conference, 1999.
- Chief Organizer of international workshop on "Modeling, Simulation and Visualization of Geophysical Mass Flows", at University at Buffalo in August 2003. Workshop attended by over 30 domestic and international participants and broadcast worldwide over the AccessGrid and internet to a large audience at many locations.
- Chief Organizer of international workshop on "Modeling and Simulation of Geophysical Mass Flows", at University at Buffalo in July 2002. Workshop was attended by over 30 domestic and international participants.
- Proposal Reviews for many research sponsors (a few samples)
 - NSF review panel for Information Technology Research – Group Grants (\$1M -\$5M)
 - NSF Community software infrastructure grant (\$ 10M)
 - Army Research Office.
 - NSF review panel for Division of Advanced Computing Research in the Computer Information Systems directorate.
- Reviewer for :
 - Computer Methods in Applied Mechanics and Engineering
 - SIAM Journal for Scientific and Statistical Computation
 - International Journal for Numerical Methods in Engineering
 - Communications in Numerical Methods in Engineering
 - Journal of Geophysical Research (Solid Earth)
 - International Journal of Computational Sciences
 - Geophysical Research Letters
 - AIAA Journal
 - several major conferences, and,

- paid book reviews for several publishers.
- Expert at Office of Cyberinfrastructure NSF, October to December 2006
- Co-editor book of Abstracts, *Symposium on Advances in Computational Mechanics*, University of Texas-Austin, Austin , Texas, January 13-15, 1997.
- Member Society for Industrial and Applied Mathematics and International Association for Computational Mechanics.

National Science Foundation (NSF) Service

Managed multiple programs resulting in about \$38 million expenditure on 31 awards from 200+ proposals in CY2007. Similar expenditures are planned for CY2008.

- *Petascale Applications* Led an interdisciplinary team of program officers from four different division of NSF namely CISE, ENG, GEO and MPS to make 18 awards for about \$26 million out of 135 proposals using four multidisciplinary panels. Program and its management were universally appreciated. Most divisions have immediately committed to a possible follow on effort this year.
- *Major Research Instrumentation* Five awards were made for approximately \$1Million. Two of these to non-PhD granting institutions were made exclusively out of OCI while in the other three OCI co-funded awards led by CISE and BIO.
- *Software Development for Cyber Infrastructure (HPC)* Managed the HPC component of the SDCI program. 4 awards including one jointly with EPSCOR of \$6Million were made using FY07 and FY08 money from about 30 proposals.
- *Strategic Technologies for Cyber Infrastructure* Lead program officer for this program 38 proposals were received in Feb 07. 3 awards totaling \$2 million were made. Aug07 24 proposals were received. A mix of adhoc and panel review was used. 3 awards totaling \$3 million are being made.
- *Cyber enabled Discovery and Innovation* Member of the CDI Working Group. Participated in the formulation of the solicitation and the ongoing management of the review process for this year a complex and occasionally contentious process. This initiative has a projected budget of over \$750 million over 5 years.
- *TeraGrid Related:* Played an active role in program management for the Teragrid (NSFs grid of supercomputing and data resources with an annual investment of over \$50M).
 - Assist in Annual Review, HPCOPS review
 - Manage 3 on 9 Resource Providers OakRidge, Indiana and Purdue
 - Monitor xRAC resource allocation process, SDSC and OakRidge,
 - Participate in TeraGrid follow-on formulation workshops etc.

- Co-manager for solicitation of TeraGrid Phase III – NSF’s follow-on investment in this area.
- Committee and Other Activities
 - MITR Participating in a group to evolve a framework to better manage multidisciplinary and transformative research.
 - Transformative Research Working Group: Nominated to panel to reform NSF processes to better enable the support of transformative and interdisciplinary research as required. Group was commissioned by the NSF Director in response to the National Science Board and Congressional mandate to improve NSF funding of such activity. The output of this group will have far reaching and major impact on NSF and its processes.
 - EPSCOR: Participated in several activities of the Office of Experimental Program to Stimulate Competitive Research. Activities include review of Research Infrastructure Grants to several states and presenting on Cyberinfrastructure at workshops and at the Annual Meeting.
- Interagency Activities:
 - Initiated collaborative effort with HPCMOD office of the Department of Defence
 - Industry Outreach Day at Oakridge
 - Attended SciDAC and other Department Of Energy events in High end Computing
 - Participate in interagency National Information Technology Research and Development coordination activities
 - Nominated to NSF-DOE committee to coordinate NSF/CDI and DOE/SCIDAC activities both are approximately \$1Billion investments in computational sciences.

University Service

- Member, Faculty Personnel Committee, School of Engineering and Applied Sciences Fall 2003-2006, Chair, Faculty Personnel Committee, School of Engineering and Applied Sciences Fall 2005-2006
- Undergraduate Director (Interim), Mechanical Engineering, Spring 2005
- Undergraduate Director, Aerospace Engineering, Fall 2000-present
 - responsible for all operational aspects of undergraduate program including advising and curriculum
 - responsible for coordinating successful ABET2000 review for Aerospace Program in 2001
 - involved in major restructuring of curriculum based on feedback from multiple stakeholders – students, alumni, faculty and employers

- Member, Undergraduate Academic Programs Committee, School of Engineering and Applied Sciences
 - coordinating Open House activities
- Serving on Academic Software Standards Committee, 2005
- Serving on UB2020 Vision Committee on Computing and Information Technology, 2005
- Chair, User Services Committee, Center for Computational Research 2005
- Member, Allocations and User Advisory Board, Center for Computational Research. 2001-present
- Mentor SEAS junior faculty mentoring program
- Mentor for minority students in Louis Stokes AMP program
- MAE Chair Search Committee, Fall-Spring 2001-2002
- MAE Chair Search Committee, Fall-Spring 2000-2001
- MAE Seminar Coordinator Spring 2000-2001
- Serving on MAE Undergraduate Studies Committee, 1998-present.
 - Led the sub-committee to formulate specific educational goals for our department, as part of the ABET2000 process 1998-99.
 - Developed joint programs between Computer Science and MAE. Spring 1999.
- Served on Faculty Search Committee for Systems and Dynamics Spring 1999, Computational Mechanics Spring 2002, 2003
- Served on seminar committee Fall 1997, Spring 1998
- Served as Faculty Adviser For MAE Graduate Student Association 1997-98
- Served on University wide committee on high performance computing leading to the formation of the Center for Computational Research
- Served on two committees associated with the Center For Computational Research (Education and User Allocation)
- Involved in mentoring freshmen 1998-present

Courses Taught

Graduate

- *MAE 500/609 CE 620/ MTH 667/COR 501: Algorithms and Applications for High Performance Computing* A new graduate course developed and taught to a school-wide

group of students on fundamental concepts of underlying high performance computers and algorithms and techniques that need to be mastered to make efficient use of these machines. Basics of parallel computer architecture, algorithms for basic linear algebra operations and analysis of parallel algorithms were covered.

- *MAE 702: Mathematical Theory of FEM:* A new course on introductory applied functional analysis and application to the theory of finite element methods.
- *MAE 500/541: Topics in FEM* A new course developed to introduce graduate students to several important topics in finite element methods namely, basic mathematical theory, *a posteriori* error estimation, adaptivity and fast solution strategies. The course has been well received and has attracted students from Mathematics, Civil Engineering, Chemical Engineering in addition to those from our department.
- *MAE 529/MAE 529Z: Introduction to FEM* A new graduate course taught both on campus and at a local company, PRAXAIR to introduce the finite element method and its applications to diverse group of graduate students (Mechanical, Chemical and Electrical engineers were all in the class).
- *MAE 477/577: CAD Applications* Taught in Spring semester 1996,1997,1998, 1999 and 2000. The objective of this class is to teach students the use the computer in all aspects of the engineering design process. A complete set of web based class notes were developed in Spring'99.

Undergraduate

- *MAE 477/577: CAD Applications:* see above.
- *MAE 415 Structures I* Modified Course taught in Fall 1997 and Fall 1998, Fall 1999 The course introduces students to basic theory of elasticity approaches and energy methods and reinforces earlier material on basic strength of material topics like beam theory. I have introduced the use of computer based tools (like MAPLE and MATLAB) and design type projects. In Fall'99 a new computer software package Visual Analysis that automates the analysis process was also introduced successfully.
- *MAE 459 Design Projects:* Supervised several groups in their projects.
- *MAE 451 Internship:* Supervised several students in their internship programs.
- *MAE 400/500 Individual Problems:* Supervised 10 students in different topics for individual study.

Other Teaching Related Activities

- Developed new techniques for using group learning in engineering classes and presented at American Society of Engineering Education (ASEE) regional meeting.
- Attended National Effective Teaching Institute organized by ASEE at Washington D.C. July, 1996.

- Attended NSF sponsored Teaching Workshop at University at Buffalo, 1998.
- Attended ASEE Conference, St. Lawrence section, at Alfred University, April 2000.

Research Supervision

Post-Doctoral

- A. C. Bauer
- C.C. Nichita
- B. Yu

Ph.D.

- J. Long, Integrated Data Management and Load Balancing for Parallel *hp* and GFEM Adaptivity , August 2001. *Currently at HKS Inc., Providence, RI*
- A. C. Bauer, Efficient Solution Procedures for Adaptive Finite Elements– Applications to Elliptic Problems, August, 2002 *Currently at Scientific Computation Research Center, Rensselaer Polytechnic, Troy, NY*
- J. H. Tsai, Adaptive Space and Time Discretizations of Updated Lagrangian Formulations - Application to Shaped Elastoplastic Fiber Pullout Using a Hybrid Interface Model, August 2004.
- S. Srivastava Mixed Discontinuous Galerkin Mixed Discontinuous Galerkin Method: Application To Non-Method: Application To Non- Linear Elastodynamics Linear Elastodynamics January, 2007.

Ph.D. *In progress*

- K. Dalbey, Uncertainty in modeling geophysical flows expected 2007.
- D. Kumar, Particle Methods for Modeling Mass Flows expected 2009.
- R. Stefanescu Terrain Modeling Error Effects on MAss Flow Computations expected 2010.

M.S. Thesis *Completed*

- J. M. dePaolo, Finite Element Analysis of Dental Implants, January 1998.
- K. S. D'Souza, Novel Model for Trabecular bone Fatigue and Regrowth, May 1998.

- D. W. Kim, Efficient Mesh Partitioning for Adaptive *hp* Finite Element Methods, May 1998.
- K. Max, Adaptive Modeling and Homogenization for Heterogeneous Materials November 1998.
- A. Laszloffy, Data Access and Storage for Parallel Adaptive FEM, August 1999.
- S. Sanjanwala, Portable Hybrid Equations Solvers, August 2001.
- R. Balasubramaniam, FEM Model of Traumatic Brain Injury, August 2001.
- I. Hatziprokopiou, Analysis Based Custom Implant Design, February 2002.
- V. Ramakkagiri, Goal Oriented Error Estimates for Adaptive Lagrangian Simulation of Hypervelocity Impact, August 2002.
- S. Xie, Numerical Modeling of UV Disinfection System, August 2002.
- A. Paliwal, Simulation of Incompressible Flows Using Meshfree Methods, April, 2004
- N. Vusirikala, Validated Computer Models for Crash Analysis of Child Restraint Systems, August 2004
- S. Srivastava Discontinuous Galerkin Methods: Application to Elastodynamics and Elastoplasticity, August 2004.
- S. Aswathnarayana, Analysis of Shaken Baby Syndrome, October, 2004
- H.H. Shah, Analysis of Slipped Capital Femoral Epiphysis, January, 2005
- Z. Xu, Optimization of SIAD Devices, February 2005.
- S. Sundaragopal, Development of new K-Means Clustering
- V. Pateel, Inverse Problem Methodology For Discovering Function from Form for Smilodon Fatalis, September, 2005.
- M. Tiwari, Domain Decomposition Solvers for Meshfree Models of Incompressible Flows, February 2006.
- D. Kumar, Modeling of Two phase granular Flows, September 2005.
- S. Arumugasundaram, Reduced Basis Functions and application to uncertainty propagation
- E. Freire, Bite force estimation of sabertooth tigers using finite element modeling

M.S. Thesis *In Progress*

- C. Thorpe, Validation and Verification of Finite Element Models, expected January 2005.

M.S. Project

- A. Ragab, Web Based Interactive Interface to Large Scale Finite Element Modeling, August 2000.
- K. Brown, Visualization of Simulation Data from Adaptive Finite Element Approximations, May 2002.
- S. Dhawale, Shape Optimization of a Ductile Fiber Head in a Composite Using Numerical Simulation, August 2003.
- R. Bhargava, Nonlinear Finite Element Analysis of Pressure Reducing Mattress, May 2003.

M. Eng. Project

- T. Li, The Application of Response Surface Methodology To The Safety Analysis of Child Restraint Systems, May 2006.

Thesis Committee Memberships (Selected)

- R. Bagwell, Ph.D. *Thesis*: Multifunction Short Shaped Copper Fiber/Thermoset Matrix Composites with Improved Toughness and EMI Shielding, Spring, 2004.
- V. Guerero, Ph.D. *Thesis*: Modeling of the Magnetoelastic Interactions in Giant Magnetostrictive Film Substrate Systems, Summer 2004.
- M. K. Jalil Ph.D. *Thesis*: Development of a Virtual Collaborative Environment for Finite Element Simulation Summer, 2001.
- V. Gupta, Ph.D. *Thesis*: Reactor Design and Reaction Engineering Studies Related to Metalorganic Chemical Vapor Deposition of Compound Semiconductor, Spring 1997.
- M. F. Chen, Ph.D. *Thesis*: "Finite Element Analysis of Spin Coating of Viscoplastic Materials and Pressure Driven Flows, Fall 1997.
- M. Segiet, M.S. *Thesis*: Carbon Fiber Thermoplast-Matrix Composites with High Damping Capacity, Fall 1998.
- H. Bui, M.S. *Thesis*: The Implementation of Programmable Logic Controllers, Spring 1998.
- R. Doleski, M.S. *Thesis*: A Shape Memory Constitutive Model Sensitive to Stress Induced Changes In The Martensitic Fraction, Spring 1998.
- S. Socci, M.S. *Thesis*: 'Design and Development of a High Flow Single Stage Servo-Valve, Fall 1999.

- F. K. Lee, M.S. *Thesis*: Use of Shaped Ductile Fibers to Improve Toughness of Composite Materials, Spring 2000.
- M. Messer, M.S. *Thesis*: Optimization of Piezoelectric Actuators and Sensors”, Spring 2000.
- W. Xie, M.S. *Thesis*: A Level Set Embedded Interface Method for Conjugate Heat Transfer Simulations of Low Speed Flows, Spring 2006.

Patents and Software Products

1. Provisional patent on ”Devices and Methods for UV Pasteurization of Continuous Flow of Fluids”, 2004
2. Adaptive Finite Elements Application Programmer’s Interface(AFEAPI): Software framework for developing adaptive *hp* finite element simulations. Software available for download from web.(<http://wings.buffalo.edu/eng/mae/acm2e>)
3. TITAN2D: Software for analysis of hazard risks due to debris flows. Software available for download from web (<http://www.gmfg.buffalo.edu>) and currently used by many researchers globally. Over 200 independent downloads in the period 2004-06.

Research Grants And Contracts

Major Awards

- *Title*: Model development for two-phase thin layer flows and validation using debris flows at Ruapehu Volcano, New Zealand
PI: M. F. Sheridan *Source*: NSF *Time Period*: Aug 2006 – Jul 2008 *Amount*: \$220,000
Patra 33%
- *Title*: CMG Research:Studies in Sedimenting Gravity Flows
PI: E. B. Pitman *Source*:NSF *Time Period*: Sep 2006- Aug 2009
Amount:\$ 459,673 *Patra*: 33%
- *Title*: FEM Simulation of Child Restraint Systems
PI: A. Patra *Source*: CUBRC *Time Period*: May 2001- Aug 2006
Amount:\$162,000 *Patra*: 100%
- *Title*: ITR/AP: Integrated Observation and Simulation Based Risk Management
PI: A. Patra *co-PI*’s: M. Sheridan, E. B. Pitman, D. Mark, C. L. Bloebaum
Source: National Science Foundation
Time Period Sep 2001 - Dec 2005
Amount: \$ 1,924,981. *Patra*: 20%

- *Title:* Parallel Adaptive Lagrangian Discontinuous Galerkin Methods with Application to Pediatric Brain Injury,
PI: A. Patra
Source: National Science Foundation,
Time Period: Jul 2001- Jun 2005
Amount: \$ 262,173 *Patra:* 100%
- *Title:* Development of SIAD device for pasteurization
PI: A. Patra
Source: New York State Technology Program (NYSTAR)
Time Period: Sep 2002 - Jan 2004
Amount: \$185,000. *Patra:* 100%
- *Title:*Fracture Toughness Improvement of Composites with Optimally Shaped Fibers
PI: R. C. Wetherhold *co-PI:* A. Patra
Source: Army Research Office, *Time Period:* June 2001-May 2004
Amount: \$300,000 *Patra:* 50%
- *Title:* Integrated Research and Education in the Use of HPC for Realistic Simulations
PI: A. Patra
Source: National Science Foundation, CAREER Award
Time Period: March 1997 – Feb. 2002
Amount: \$206,000 *Patra:* 100%

Other Awards

- *Title:* Supplement to CAREER Award
PI: A. Patra
Source: National Science Foundation *Time Period:* Jan 2001-May2001
Amount: \$25,000*Patra:* 100%
- *Title:* Flow Analysis for Small Scale Pumps
PI: A. Patra
Source: Everfab Inc.
Time Period: Jan 2001-May2001
Amount: \$16,000. *Patra:* 100%
- *Title:*Development of Parallel Adaptive *hp* FEM Simulations
PI: A. Patra *Source:* National Partnership for Advanced Computing Initiative (NPACI)
Amount: Supercomputer time allocation of 4500 hours. *Patra:* 100%
- *Title:* Development of FEM Models for Brain Impact Injury,
PI: A. Patra, *co-PI:* B. Donnelly,
Source: CUBRC *Time Period:* Jan-Dec. 2000

Amount:\$25,000*Patra: 100%*

- *Title:* Donation of computer equipment
PI: A. Patra
Source: Fisher Price, East Aurora, *Time Period:* Jan 2001
Amount:\$30,000 *Patra: 100%*
- *Title:* Development of Computer Simulation for Implant Surgery Planning,
PI: A. Patra *co-PI:* S. Andreana, School of Dental Medicine,
Source: UB Pilot Program *Time Period:* June 2000-May 2001,
Amount:\$25,000 *Patra: 100%*
- *Title:* Development of Parallel Adaptive Hp Fem Simulations for Bone-Implant Structures
PI: A. Patra
Source: National Partnership for Advanced Computing Initiative (NPACI)
Amount: Supercomputer time allocation of 3000 hours *Patra: 100%*
- *Title:*Supplement to CAREER Award
PI: A. Patra
Source: National Science Foundation *Time Period:* Jan 2000-May2000
Amount: \$25,000 *Patra: 100%*
- *Title:*Development of Parallel Adaptive *hp* Fem Simulations for Bone-Implant Structures
PI: A. Patra
Source: National Partnership for Advanced Computing Initiative (NPACI)
Amount: Supercomputer time allocation of 3500 hours
- *Title:* FEM modeling of Osteogen Dental Implant
PI: A. Patra
Source: Osteogen and BUD Inc. *Time Period:* May '99
Amount:\$ 4,000*Patra: 100%*
- *Title:* Analysis of Locomotive Lifter
PI: A. Patra
Time Period: June '99
Source: Buffalo Lifting Products, Buffalo, NY
Amount:\$ 1,800 *Patra: 100%*
- *Title:* Adaptive Methods For Computational Impact Mechanics
PI: A. Patra
Source: Institute For Advanced Technology, University of Texas-Austin
Time Period: May '97 – Dec'97
Amount:\$ 11,500. *Patra: 100%*
- *Title:* Analysis and Compensation of Hydraulic Control Valve Flow Forces
PI: A. Patra *co-PI:* Dr. T. Singh
Source: Moog Inc., Buffalo, NY *Time Period* Oct '97-Feb '98

Amount:\$14,628 *Patra:* 50%
Renewed with \$11,000 in services from Moog

- *Title:* Finite Element Analysis and Redesign of Dental Implants
PI: A. Patra *co-PI:* Dr. M. Meenaghan
Source: Small Business Administration through the GRIT program
Time Period: September '96 – May '97
Amount:\$ 30,000 *Patra:* 50%
- *Title:* TICAM Visiting Fellowship
Source: Texas Institute for Computational and Applied Mathematics,
Time Period: Summer 1999
Amount:\$5000
- *Title:* Travel Grant
Source: International Conference on Domain Decomposition Methods
Time Period: June'96
Amount:\$ 500 *Patra:* 100%

Archival Journal Publications

A *is used to mark all students.

1. Liou, F. W. and Patra, A., 1993, Development of An Advisory Expert System for Elastic Mechanism Design, *Computers and Structures*, Vol. 46, No. 1, pp. 125-132.
2. Shao, C. and Liou, F. W. and Patra, A., 1993 A Contact Phase Model for the Analysis of Flexible Mechanisms Under Impact Loading, *Computers and Structures*, Vol. 49, No. 4, pp. 617-623.
3. Liou, F. W. and Patra, A., 1994, An Advisory System For the Analysis and Design of Deformable Beam-type and Multibody Systems, *Mechanisms and Machine Theory* Vol. 29, no. 8, pp.1205-1218.
4. Oden, J.T., Patra, A., and Feng, Y., 1994, Domain Decomposition for Adaptive *hp* Finite Element Methods, *American Mathematical Society series Contemporary Mathematics*, American Mathematical Society, Vol. 180, pp. 295-301.
5. Oden, J. T and Patra,A., 1995, A Parallel Adaptive Strategy For *hp* Finite Elements, *Comp. Meth. App. Mech. and Engg.*, Vol. 121, pp. 449-470.
6. Bey, K.S., Oden, J.T. and Patra, 1995, A. *hp* Version Discontinuous Galerkin Methods for Hyperbolic Conservation Laws: A Parallel Adaptive Strategy, *International Journal for Numerical Methods Engineering*, Vol. 38, pp. 3889-3908.
7. Patra, A. and Oden, J. T., 1995, Problem Decomposition Strategies for Adaptive *hp* Finite Element Methods, *Computing Systems in Engineering*, Vol. 6, no. 2 pp. 97-109 .

8. Bey, K.S., Oden, J.T. and Patra, A., 1996, A Parallel *hp*-Adaptive Discontinuous Galerkin Method For Hyperbolic Conservation Laws, Applied Numerical Mathematics Vol. 20, pp. 321-336.
9. Patra, A. and Oden, J.T., 1997, Computational Techniques for Adaptive *hp* Finite Element Methods, Finite Elements in Analysis and Design. Vol. 25, pp. 27-39.
10. Oden, J.T., Patra, A., Feng, Y.S., 1997, Parallel Domain Decomposition Solvers for Adaptive *hp* Finite Element Methods, SIAM Journal for Num. Anal., Vol. 34, no. 6, 2090-2118.
11. LeTallec, P. and Patra, A., 1997, Non-overlapping Domain Decomposition Methods For *hp* Approximations of the Stokes Problem with Discontinuous Pressure Fields Comp. Meth. in App. Mech. and Engg. Vol 145, pp. 361-379
12. Patra, A. Depaolo, J. M.*, d'Souza, K.S.*, deTolla, D.*, Meenaghan, M., 1998, Analysis and Design Guidelines For Dental Implants Implant Dentistry Vol. 7, no. 4, pp 355-368.
13. deTolla, D.*, Andreana, S., Patra, A., Buhite, R. and Comella, B.*, 2000, The Role of FEM Dental Implants, J. Oral Implantology, Vol. XXVI, no. 2, pp.77-81.
14. Laszloffy, A.*, Long, J.* and Patra, 2000, A Simple Data management Schemes and Scheduling Schemes For Managing the Irregularities in Parallel Adaptive *hp* Finite Element Simulations Parallel Computing Vol. 26, pp.1765-1788.
15. Patra, A. and Gupta, A., 2001, A Strategy for Adaptive *hp* mesh modification using Non-Linear Programming, Comp. Meth. App. Mech and Eng. Vol 190, pp. 3797-3818.
16. Bauer A. C.* and Patra, A., 2002, Performance of parallel preconditioners for adaptive *hp* FEM discretization of incompressible flows, Comm. Num. Meth. Eng Vol 18 no. 5, pp. 305-313.
17. Sheridan, M.F., Bloebaum, C.L., Kesavadas, T., Patra, A.K, and Winer, E., 2002, Visualization and Communication Risk Management of Landslides. C.A. Brebbia (editor), Risk Analysis III, WIT Press, Southampton, pp. 691-701.
18. Patra, A. Laszloffy A.* and Long, J.*, 2003, Data Structures and Load Balancing for Parallel Adaptive *hp* Finite Element Methods, Comp. and Math. with Appl. Vol. 46, pp. 105-123.
19. Wetherhold, R.C., Messer, M.* and Patra, A., 2003, Optimization of Directionally attached Piezoelectric Actuators, J. Eng. Mat. Techn. Vol 125 no 2, pp. 148-152.
20. Pitman, E. B., Nichita, C.C., Patra, A., Bauer, A., Sheridan, M. and Bursik, M., 2003, Computing Debris Flows and Landslides, Physics of Fluids, Vol 15, no. 12, pp 3638-3646..
21. Tsai, J.*, Patra, A. and Wetherhold, R. C., 2003, Numerical Simulations of fracture toughness improvement using short shaped head ductile fibers, Composites Part A Vol.34, pp. 1255-64.

22. Pitman, E.B., Nichita, C.C. *, Patra, A.K., Bauer, A.C. *, Bursik, M, and Weber, A. * A model of granular flows over an erodible surface, 2003, Discrete and Continuous Dynamical Systems: Series B Mathematical Modeling, Analysis and Computations Vol. 3 no. 4, pp. 589-599.
23. Bauer, A.C. *, and Patra, A.K., 2004, Robust and efficient Domain Decomposition Preconditioners for adaptive *hp* finite element approximations of linear elasticity with and without discontinuous coefficients, International Journal Numerical Methods in Engineering Vol. 59, no. 3, Pages: 337-364.
24. Patra, A.K., Bauer, A. C. *, Nichita, C. *, Pitman, E.B., Sheridan, M. F., Bursik, M., Rupp, B. *, Webber, A. *, Namikawa, L. * and Renschler, C., 2005, Parallel Adaptive Numerical Simulation of Dry Avalanches over Natural Terrain Journal of Volcanol. and Geothermal Research, Vol 139, pp. 1-21.
25. Bursik, M., Patra, A., Pitman, E.B., Nichita, C., Macias, J. L., Saucedo, R., Girina, O., 2005, Advances in Studies of Dense Volcanic Granular Flows, Reports on Progress in Physics, Vol. 68, No. 2, 2005.
26. Litonjua, L.A., Andreana, S. Patra, A. and Cohen, R.E., 2004, The Bio-Engineering theory of abfraction. A Review, Bio-Medical Materials and Engineering, Vol. 14, no. 3 pp. 311-321.
27. Sheridan, M. F., Stinton *, A.J, Patra, A., Pitman E. B., Bauer, A. and Nichita, C.C. Evaluating TITAN2D mass-flow model using 1963 Little Tahoma Peak avalanches, Mount Rainier Washington, 2005, J. Volcanol. Geotherm. Res., Vol 139, pp.89-102.
28. Tsai, J. *, Patra, A. and Wetherhold, R, 2005, Finite Element Simulation of Shaped Ductile Fiber Pullout Using a Mixed Cohesive Zone/Friction Interface Model Composites Part A, Vol. 36, no. 6, pp. 827-838 .
29. Paliwal, A. * and Patra, A. The least-squares meshfree method for incompressible flows with and without free surfaces, accepted in Int. J. Num. Meth. in Eng.
30. Patra, A. K., Nichita, C.C., Bauer, A.C., Pitman, E.B., Bursik, M. and Sheridan, M.F. Parallel Adaptive Discontinuous Galerkin Approximation For Thin Layer Avalanche Modeling to appear Computers and Geosciences.
31. Armstrong, D., Fishkin, Z., Shah, H., Cassidy, J., Patra, A., Mihalko, W., Proximal Femoral Physis Shear in Slipped Capital Femoral Epiphysis - a Finite Element Study, J. of Pediatric Orthopaedics. 2006; 26:291-294
32. Rupp, B., Bursik, M., Namikawa, L., Webb, A., Patra, A.K., Saucedo, R., Macas, J.L., and Renschler, C., 2006, Computational modeling of the 1991 block and ash flows at Colima Volcano, Mexico, in Siebe, C., Macas, J.L., and Aguirre-Daz, G.J., eds., Neogene-Quaternary continental margin volcanism: A perspective from Mexico: Geological Society of America Special Paper 402, Penrose Conference Series, p. 237-252, doi: 10.1130/2006.2402(11).

33. Stinton A., Sheridan, M.F., Patra, A., Dalbey, K., and Namikawa, L., 2006, Incorporation of variable bed friction into Titan2D mass flow model: Application to Little Tahoma Peak avalanches, Washington, Acta Vulcanologica, 16(1-2): 153-163.
34. Dalbey, K., Patra A., Pateel, V., Arumugasundaram, S., I. Hatziprokopiou, Galgansji, R., Incorporating Input Data Uncertainties in Computer Models of Vehicle Systems using the Polynomial Chaos Quadrature Method, Transactions of the SAE, V115-6, 2006 Document no. 2006-01-1139
35. Dalbey, K., Patra A., Pitman, E., Bursik, M., and Sheridan, M., Input Uncertainty Propagation Methods and Hazard Mapping of Geophysical Mass Flows, to appear, J. Geophysical Research – Solid Earth.
36. Srivastava, S. and Patra, A., Interior Penalty and Mixed Discontinuous Galerkin Methods for Elasticity, Comp. Meth. App. Mech and Eng. in revision.

Papers in Review

1. M.J. Bayarri, J.O. Berger, E. Calder, K. Dalbey, S. Lunagomez, A.K. Patra, E.B. Pitman, E. Spiller, R.L. Wolpert, Using Statistical and Computer Models to Quantify Volcanic Hazards, submitted to Technometrics
2. D. Kumar, A. Patra, L. Le, E.B. Pitman M.F. Sheridan, M. Bursik Two Phase Models of Debris Flows on Natural Terrain, submitted to J. Volc. Geophys. Res.
3. Vusirikala*, N., Patra, A., Hulme, K., I. Hatziprokopiou, R. Galganski, Modeling, Simulation and Visualization of CRS Systems for Use in Testing Pediatric Safety Related Hypotheses and CRS Design submitted to International Journal of Crashworthiness.
4. Yu, B., Bursik, M., Patra, A., Negligible Velocity as a Stopping Criteria for Geophysical Flows Models submitted to J. Geophysical Research.
5. Nichita, C., Bursik, M., Patra, A., Pitman, E.B., Rupp, B. and Webb, A., Model of Erosional Volcanic Granular Flows, submitted to Geophysical Research Letters.

Book Chapters

1. Bauer, A.C. Sanjanwala, S. and Patra, A., Portable Efficient Solvers for Adaptive Finite Element Simulations of Elastostatics in Two and Three Dimensions, in Recent Developments in Domain Decomposition Methods ed. L. Pavarino and A. Tosselli, Springer Verlag, New York, 2002.
2. Patra, A.K. and Rae, W., Aerospace Engineering in Buffalo – the X Factor, in Aerospace Engineering Education During the First Century of Flight ed. B. McCormick, C. Newbury and E. Jumper, AIAA, 2004.

Full Papers in Conference Proceedings - Reviewed

1. Dalbey, K., Patra, A., Pateel, V., Arumugasundaram, S., Hatziprokopiou, I., Galganski, R., Incorporating Input Data Uncertainties in Computer Models of Vehicle Systems using the Polynomial Chaos Quadrature Method, SAE Paper 20006-01-1139.
2. Galganski, R., Hatziprokopiou, I., General, Pateel, V., Arumugasundaram, S., Patra, A., Reexamination of FMVSS 213 Using New Car Assessment Program Test Data, SAE Paper 2006-01-1143.
3. Hulme, K., Patra, A., Arumugasundaram, S., Galganski, R., Hatziprokopiou, I., Real-time and Remote Scientific Visualization as a Practical Aid for Improved Child Restraint System Analysis, SAE Paper 2006-01-1650.
4. J. Tsai and A. Patra, Adaptive Space and Time Discretizations of Updated Lagrangian Formulations - Simple Error Estimation and Application to Shaped Elastoplastic Fiber Pullout Using a Hybrid Interface Model, International Conference on Computational Engineering and Sciences, Chenani, India, December, 2005, Paper number ICCES0520050715344
5. Stinton, A. J., Delaite, G., Burkett, B., Sheridan, M., Thouret, J. C., and Patra, A., TITAN2D simulated debris flow hazards: Arequipa, Peru, International Symposium on Environmental Software Systems, James Madison University, Harrisonburg, Virginia, US, May 2004.
6. Hulme, K.F., Patra, A., Galganski, R., Vusirikala, N., and Hatziprokopiou, I., A Virtual Prototyping Toolkit for Assessment of Child Restraint System (CRS) Safety. Society of Automotive Engineers 2004 World Congress, Detroit, Michigan, March, 2004.
7. Galganski, R., Hulme, K.F., Patra, A., Vusirikala, N., and Hatziprokopiou, I., Integrated Sled Testing, Computer Modeling, and Scientific Visualization for Crashworthy Child Restraint System Design. Intelligent Transportation Systems Safety and Security Conference, Miami, Florida, March, 2004.
8. Fishkin, Z., Armstrong, D., Shah, H., Cassidy, J., Patra, A., Mihalko, W., Acetabular deepening as a factor in Slipped Capital Femoral Epiphysis - A Radiographic and Finite Element Analysis Study, Pediatric Orthopedic Society of North America 2004
9. Hulme, K.F., Patra, A., Galganski, R., and Vusirikala, N., Development of a Visualization Module for Madymo-based Child Restraint System (CRS) Safety Simulation. TNO MADYMO 5th Users' Meeting of the The Americas, Troy, Michigan, October, 2003.
10. Renschler, C.S., Sheridan, M., Bursik, M., Patra, A., Pitman, E. B., Namikawa L.: Uncertainties and scales in geo-spatial modeling of volcano hazards, International Association of Geomorphologists (IAG) and the Mexican Society of Geomorphology (SMG) in Mexico City, Mexico, from October 27th to November 2nd, 2003.
11. Pitman, E.B. Patra, A., Bauer, A., Sheridan, M. and Bursik, M. (2002) Computing Debris Flows and Landslides: Towards a Tool for Hazard Risk Evaluation, in *Proc. Hyp '02* T. Hou and E. Tadmor, eds.

12. Patra, A., Goal Oriented Error Estimates for Adaptive Lagrangian Simulation of Hyper-velocity Impact, European Conference on Computational Mechanics, June 2001.
13. Patra A. and Long, J., Integrated Data Management and Load Balancing Schemes for 3D Parallel Adaptive hp FEM, European Conference on Computational Mechanics, June 2001.
14. Bauer, A. C., and Patra, A., Preconditioners for parallel adaptive hp FEM in 3 Dimensions, First MIT Conference on Computational Mechanics, June,2001.
15. Long J., and Patra, A., Data Management and Ordering Schemes for parallel adaptive hp FEM in 3 Dimensions, First MIT Conference on Computational Mechanics, June,2001.
16. Patra, A., Laszloffy, A., and Long,J., Efficient Parallel Adaptive Finite Elements Using Self Scheduling Data and Computations, in High Performance Computing – Hipc’99 ed. P. Banerjee et. al. Springer Verlag Lecture Notes in Computer Science, no 1745, 1999.
17. Patra, A., Bauer, A. C., Olewnick, J.C., and Singh, T., Shape Optimization on a Spool in a Four-Way Hydraulic Servo-Valve Using hp Adaptive Finite Element Methods, 3rd World Congress on Structural and Multidisciplinary Optimization, Amherst, NY, May 1999.
18. Patra, A., Laszloffy A., and Long, J., AFEAPI: Adaptive Finite Elements Application Programmers Interface, IXth SIAM Parallel Processing Conference, San Antonio, March, 1999.
19. Patra A., and Kim, D.W., Efficient Mesh Partitioning for Adaptive hp finite element methods in Proceedings of XI th International Conference on Domain Decomposition Methods, Greenwich , U.K., August, 1998.
20. Patra, A., Newton-Krylov Solvers for Adaptive hp Finite Element Analysis of the Incompressible Navier-Stokes Equations, in Proceedings of IX th International Conference on Domain Decomposition Methods, Bergen, Norway.
21. Patra, A., Fast Solvers for Adaptive hp Finite Element Methods VIIIth SIAM Conference on Parallel Processing Minneapolis, March, 1997.
22. Oden, J. T. and Patra, A., Parallel Adaptive hp Finite Element Approximations For Stokesian Flows: Adaptive Strategies, Load Balancing and Domain Decomposition Solvers with J. T. Oden Parallel Computational Fluid Dynamics – Implementation and Results Using Parallel Computers Elsevier Sciences B.V., January, 1996.
23. Oden, J. T., Patra, A., and Feng, Y.S., Parallel Adaptive hp Finite Element Methods For Problems in Fluid and Solid Mechanics, in R. L. Taylor Anniversary Volume, Intl. Ctr. For Num. Methods in Engg. Press, Barcelona, Sept. 1994.
24. Bey, K.S., Patra, A., and Oden, J. T., Parallel hp adaptive Discontinuous Galerkin Methods for hyperbolic conservation laws, Proceedings of the 14th IMACS World Congress on Computational and Applied Mathematics, Atlanta, GA, July, 1994.

25. Oden, J. T., Patra, A. and Feng, Y. S., Domain Decomposition for Adaptive *hp* Finite Elements, at VII th International Conference on Domain Decomposition Methods, State College, Pennsylvania, June, 1994.
26. Batra, R. C., Ko, K. I., and Patra, A., Analysis of Shear Bands in Dynamic Plain Strain Compression of a viscoplastic solid Recent Advances in Mechanics of Structured Continua, ASME Winter Annual Meeting 1992.
27. Oden, J. T., Patra, A., and Feng, Y.S., An *hp* Adaptive Strategy, in Adaptive, Multilevel and Hierarchical Computational Strategies, A. K. Noor(ed)., AMD-Vol. 157, 1992, pp. 23-46.
28. Liou, F. W., and Patra, A., An Advisory Expert System for the Design of High-Speed Mechanisms, in Proceedings of the 1990 ASME Mechanisms Conference, Chicago, September 17-19, 1990, DE-VOL-24, pp. 153-160

Major Conference Presentations – Reviewed Abstracts

1. M. Bursik, D. Kumar, A. Patra, E. B. Pitman, M. F. Sheridan, Application of Two-fluid Models to Debris Flows, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract V42B-03
2. K. Dalbey, A. Patra, E. B. Pitman, M. F. Sheridan, M. Bursik, Propagating Input Parameter Uncertainty in Geophysical Mass Flow Modeling Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract V31D-0646
3. A. Patra M. Tiwari and M. Jones, Supporting Dynamic Parallel Adaptive Mesh/Meshfree Simulations, USNCCM8, Austin , TX, August 2005
4. S. Srivastava and A. Patra, Discontinuous Galerkin Deforming Grid(DGDG) Method For Elastodynamics And Elastoplastic Impact, USNCCM8, Austin , TX, August 2005
5. K. Dalbey, A. Patra and E. B. Pitman and M. F. Sheridan Uncertainty Modleing and Hazard Assessment for Geophysical Mass Flows, USNCCM8, Austin , TX, August 2005.
6. A. Patra, Modeling Hazardous Geophysical Mass Flows, SIAM Parallel Processing'06, San Francisco, CA, February, 2006
7. A. K. Patra, E Bruce Pitman, M. Jones, and K. Dalbey, Developing and Supporting a Large Scale Parallel Application for Scientific Users - The TITAN Geophysical Mass Flow Code Experience, SIAM Parallel Processing'06, San Francisco, CA, February, 2006
8. Michael F. Sheridan and Abani K. Patra, The Titan project: computational modeling of granular and wet mass flows for volcanic hazards applications, CITIES ON VOLCANOES 4, Quito, Ecuador, January, 2006
9. C. Widiwijayanti, D Hidayat, B Voight, A Patra, EB Pitman, Modelling pyroclastic flows with TITAN2D, Cities on Volcanoes, Ecuador, January, 2006.

10. Dalbey, K., Patra, A., Pitman, E., Sheridan, M., Bursik, M. Quantifying uncertainties in models of geophysical mass flows using the Titan2D toolkit, European Geosciences Union, General Assembly 2005, Vienna, Austria, April 2005
11. Kumar, D, Patra, A., Le, L., Pitman, E., Sheridan, M., Bursik, M. Modeling debris flows using the Titan2D toolkit European Geosciences Union, General Assembly 2005, Vienna, Austria, April 2005
12. Stinton, A.J., Sheridan, M.F., Patra, A., Dalbey, K., Namikawa, L. Incorporating variable bed friction into the Titan2D geophysical mass-flow model using a GIS layer, European Geosciences Union, General Assembly 2005, Vienna, Austria, April 2005
13. Patra, A., Integrated Simulation and Visualization Tools for Geophysical Mass Flow Hazard Risk Analysis – the Titan Toolset, SIAM Computational Sciences and Engineering, Orlando, FL, February 2005.
14. Patra, A., Jones, M., Dalbey, K., and Pitman, E. B., Adaptive Simulation: Dynamic Data Driven Application in Geophysical Mass Flows SIAM Computational Sciences and Engineering, Orlando, FL, February 2005.
15. Patra, A. and Srivastava, S., Local Discontinuous Galerkin Methods for Elastodynamics and Elastoplasticity SIAM Computational Sciences and Engineering, Orlando, FL, February 2005.
16. Patra, A., Pitman, E. B., Dalbey, K., and Sheridan, M., Representing Uncertainty in Modeling Geophysical Mass Flows, SIAM Computational Sciences and Engineering, Orlando, FL, February 2005.
17. Patra, A., Tiwari, M., and Paliwal, A., Domain Decomposition Solvers for Least Square Meshfree Methods, International Conference on Domain Decomposition Methods, New York, January, 2005.
18. Patra, A., and Bauer, A., Preconditioners and Solvers for Adaptive hp Approximations of the Equations of Elasticity, XIth International Conference on Domain Decomposition Methods, New York, January, 2005.
19. Pitman, E. B., Patra, A., Dalbey, K., Namikawa, L., Rupp, B., Bursik, M., Sheridan M., Uncertainty in Computational Simulations of Geophysical Mass Flows, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract H13B-0414
20. Widwijayanti, C., Voight, B., Hidayat, D., Patra, A. and Pitman, E. B., Validation of TITAN2D flow model code for pyroclastic flows and debris avalanches at Soufrière Hills Volcano, Montserrat, BWI Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract V43B-1428
21. Yu, B., Dalbey, K., Bursik, M., Patra, A., Pitman, E. B., (2004), Estimation of a Stopping Criterion for Geophysical Granular Flows Based on Numerical Experimentation , Title, Eos Trans. AGU, 85(47), Fall Meet. Suppl., H33G-05

22. Procter, J., Cronin, S., Sheridan, M., Patra, A., Application of TITAN2D mass-flow modeling to assessing hazards from a potential lake-breakout lahar at Ruapehu volcano, New Zealand, IAVCEI, Pucon, Chile, November 2004.
23. Namikawa, L., Rupp, B. M., Bursik, C., Renschler, A., Patra, E.B., Pitman, R., Saucedo, J.L., Macias, C., Nichita Calculation of inundation zones for block and ash flows, and estimation of error, IAVCEI, Pucon, Chile, November 2004.
24. Widwijayanti, C., Voight, B., Hidayat, D., Patra, A. and Pitman, E. B., Validation of TITAN2D flow model code for pyroclastic flows and debris avalanches on Montserrat, IAVCEI, Pucon, Chile, November 2004.
25. Patra, A., Sheridan, M., Pitman, E.B., Bursik, M., Renschler, C., Nichita, C., Yu, B., Bauer A. C., and Dalbey, K., Modeling and Simulation of Geophysical Mass Flows Using the TITAN toolset, CMG2004: 25th IUGG Conference on Mathematical Geophysics, June 2004, New York, NY.
26. Sheridan, M., Stinton, A., Burkett, B., Patra, A., Nichita, C., Pitman, E. B., Application of Titan2D mass-flow model to potential hazards at Tungurahua Volcano, Ecuador, 1st General Assembly, European Geophysical Union General Assembly, EGU04-A-01693, Nice, April 2004.
27. Patra, A., Pitman, E. B., Dalbey, K., and Sheridan, M., Computational Modeling of Hazardous Geophysical Mass Flows – the TITAN toolset, 1st General Assembly, European Geophysical Union General Assembly, EGU04-A-01711, Nice, April 2004.
28. Webb, A., Bursik, M., Nichita, C., Patra, A., Pitman, E. B. , and Sheridan, M., Erosion and its Effects on Geophysical Granular Avalanches, Eos Trans.AGU,84(46), Fall Meet. Suppl., Abstract H31C-0478, 2003
29. Patra, A., Pitman, E. B., Nichita C. C., Sheridan, M., Bursik M., and Bauer A., Parallel Adaptive Computer Simulations of Geophysical Mass Flows VII US National Congress on Computational Mechanics Albuquerque, New Mexico, July 28-31, 2003
30. Hulme, K. F., Patra, A., Galganski, R., Vusirikala, N., and Hatziprokopiou, I., A Virtual Prototyping Toolkit for Assessment of Child Restraint System (CRS) Safety. Society of Automotive Engineers 2004 World Congress, Detroit, Michigan, March, 2004.
31. Bauer, A., Sanjanwala S., and Patra, A., Parallel Adaptive hp FEM for Linear Elastodynamics - Solvers and Preconditioners, VII US National Congress on Computational Mechanics Albuquerque, New Mexico, July 28-31, 2003
32. Fishkin, Z., Armstrong, D., Shah, H., Cassidy, J., Patra, A., Mihalko, W., Acetabular deepening as a factor in Slipped Capital Femoral Epiphysis - A Radiographic and Finite Element Analysis Study, Pediatric Orthopedic Society of North America 2004
33. Tsai, J., Patra, A., and Wetherhold, R., Simulation of Ductile Fiber Pullout Based on a Mixed Cohesion and Friction Model, VII US National Congress on Computational Mechanics Albuquerque, New Mexico, July 28-31, 2003

34. Patra, A. and Aswathnarayana, S., FEM Modeling Of Pediatric Brain Injury Under Cyclic Loads VII US National Congress on Computational Mechanics Albuquerque, New Mexico, July 28-31, 2003
35. Aswathnarayana, S. and Patra, A., Finite Element Analysis of Shaken Baby Syndrome, Abstract 689, Pediatric Academic Societies Meeting, May 2004.
36. Patra, A., and Bauer, A., Iterative Substructuring Solvers for Adaptive hp FEM with a Simple Coarse Grid Preconditioner, Mathematics of Finite Elements and Applications, Brunel University, London, U.K. June, 2003.
37. Patra, A., Bauer, A. C., Nichita C., and Pitman, E. B., Parallel Adaptive Schemes for Geophysical Mass Flows Over Natural Terrain, Mathematics of Finite Elements and Applications, Brunel University, London, U.K. June, 2003.
38. Patra A. and Ramakkagari, V., Development of Parallel Adaptive Lagrangian Methods for Pediatric Brain Injury Simulations , Special Symposium on Computational Methods in honor of Prof J. T. Oden, Fourteenth U.S. National Congress of Theoretical and Applied Mechanics, Blacksburg, VA June 23-28, 2002
39. Patra, A., Ramakkagari, V., New Error Estimators and Adaptive Schemes for Updated Lagrangian Formulations Fast and Efficient Methods for PDE and Applications, SIAM Computational Sciences and Engineering Conference, San Diego, February, 2003.
40. Patra, A., Bauer, A., and Nichita, C., Developing High Resolution Simulations of Geophysical Mass Flows Using Solution Adaptive Methods SIAM Computational Sciences and Engineering Conference, San Diego, February, 2003.
41. Bauer, A. and Patra, A., Multi-Level Preconditioners for Adaptive hp Finite Element Simulations Simple Algebraic Coarse Grid Construction SIAM Computational Sciences and Engineering Conference, San Diego, February, 2003.
42. Pitman, E., Patra, A., Bauer, A., Sheridan, M. and Bursik, M. Computing Debris Flows and Landslides Multicomponent and Multiphase Fluid Dynamics, Fourteenth U.S. National Congress of Theoretical and Applied Mechanics, Blacksburg, VA June 23-28, 2002
43. Pitman, E. B., Nichita, C., Patra, A., Bauer, A. Recent Developments in the Mathematical Modeling of Geophysical Mass Flows , SIAM Computational Sciences and Engineering Conference, San Diego, February, 2003.
44. Pitman, E., Patra, A., Nichita, C. C., Bauer, A. C., Sheridan, M., Bursik, M., 2003. Modeling Geophysical Mass Flows, AGU/EGS/EUG Spg Meet., Geophys Res Abstrs, 5, 07342
45. Rupp, B., Bursik, M., Patra, A., Pitman, E. B., Bauer, A. C., Nichita, C. C., Saucedo, R., Macias, J., 2003, Simulation of Pyroclastic Flows of Colima Volcano, Mexico, Using the TITAN2D Program, AGU/EGS/EUG Spg Meet., Geophys Res Abstrs, 5, 12857

46. Sheridan, M., Stinton, A. J., Patra, A., Pitman, E. B., Bauer, A., Nichita, C., Evaluating TITAN2D mass-flow model using the 1963 Little Tahoma Peak avalanches, Mount Rainier, Washington, AGU/EGS/EUG Spg Meet., Geophys Res Abstrs, 5, 14695
47. Patra, A., Bauer, A., Pitman, E. B., Sheridan, M. F., Bursik, M., Parallel adaptive numerical simulation of dry avalanches over natural terrain, AGU/EGS/EUG Spg Meet., Geophys Res Abstrs, 5, 11982
48. Sheridan, M., Stinton, A., Patra, A., Pitman, E. B., Bauer, A., Nichita, C., Mass Flow Models Applied to potential ash flows and debris flows at Tungurahua Volcano, Ecuador: Naples Institute of Geophysics and Volcanology, Vesuviano Observatory, Workshop on Vesuvius Hazards, May 2003, Naples, Italy,
49. Tsai, J., Bagwell, R., Patra, A., Wetherhold, R., Fracture Toughness Improvement Using Shaped Short Ductile Fibers, Fourteenth U.S. National Congress of Theoretical and Applied Mechanics, Blacksburg, VA June 23-28, 2002
50. Patra, A., Portable Hybrid Equation Solvers, X^{th} SIAM Parallel Processing Conference, March, 2001.
51. Patra, A., Integrated Data Management and Load Balancing for Parallel Adaptive Finite Element Methods, First SIAM Computational Sciences and Engineering Conference, Washington D.C., September, 2000.
52. Patra, A., and Gupta, A., Adaptive hp Approximations of Morphogenetic Reaction Diffusion Equations, First SIAM Computational Sciences and Engineering Conference, Washington D.C., September, 2000.
53. Patra, A., Long, J., and Bauer, A., On the Development of Large Scale Parallel Adaptive 3D Codes: Data Management Schemes and Multi-Level Iterative Substructuring Solvers, p-FEM200, Washington University, St. Louis, MO, May 31-June 2, 2000.
54. Patra, A., and Bauer, A., Parallel Preconditioned Iterative Solvers for Adaptive hp Discretizations of the Stationary Navier-Stokes Equations, Finite Elements in Flow 2000, Austin, TX, April 2000.
55. Patra, A., Error Indicators for Lagrangian Simulations of Hypervelocity Impact Including Shape Quality Concerns, Finite Elements in Flow 2000, Austin, TX, April 2000.
56. Patra, A., Seven Plus One Simple Habits For Using Groups in Teaching Engineering, American Society of Engineering Education, St. Lawrence Section, Alfred University, Alfred, NY, April, 2000.
57. Mayne, R. W., Patra, A., Wetherhold, R. C., Lewis, K., and Rae, W. J., Surveying Students and Alumni for Evaluation of a B.S. Program in Mechanical Engineering, International Conference on Engineering Education, Taipei, August 2000.
58. Comella, B., Andreana, S., and Patra, A., Design of an Interactive Bridge for Implant Loading Studies International Association of Dental Research Meeting, Washington, April, 2000.

59. Patra, A., Development of Some Error Indicators and Adaptive Methods for Lagrangian Simulations of Hypervelocity Impact, 5th U.S. National Congress on Computational Mechanics, Boulder, CO, August, 1999.
60. Patra, A., Development of Domain Decomposition Solvers for FEM Simulation of Dental Implants Using Multi-domain Material Models and Adaptive hp Finite Element Methods, , 5th U.S. National Congress on Computational Mechanics, Boulder, CO, August, 1999.
61. Patra, A., Laszloffy, A., and Long, J., Supporting Parallel Adaptive FEM – Data Structures, Load Balancing and Solution Strategies, 5th U.S. National Congress on Computational Mechanics, Boulder, CO, August, 1999.
62. Patra, A., D’Souza, K., Meenaghan, M., and deTolla, D., Simulation of Dental Implants Using a Voronoi Tessellation based Frame Model of Trabecular Bone and p version Finite Elements for Cortical Bone Mathematics of Finite Elements and Applications, 1999, Brunel University, London, June 1999.
63. Patra, A., Long, J. and Laszloffy, A., , AFEAPI: Adaptive Finite Elements Application Programmers Interface Mathematics of Finite Elements and Applications, 1999, Brunel University, London, June 1999.
64. Patra, A. K., Industrial Strength Solvers – Domain Decomposition, Iterative and Multi-Level Substructuring Mathematics of Finite Elements and Applications, 1999, Brunel University, London, June 1999.
65. Patra, A., AFEAPI: Adaptive Finite Elements Application Programmers Interface, IXth SIAM Parallel Processing Conference, San Antonio, March, 1999.
66. Patra, A., Long, J. and A. Laszloffy , AFEAPI: A Simple Infrastructure for Parallel Adaptive hp FEM Using Self-Organizing Data and Computations, First Workshop on Parallel Computing for Irregular Applications, held in conjunction with High Performance Computing Architectures-5, Orlando, FL, January, 1999.
67. Patra, A., Kim, D., Efficient Mesh Partitioning for Adaptive hp finite element methods International Conference on Domain Decomposition Methods, Greenwich , U.K., August, 1998.
68. Patra, A., Gupta, A., Optimal Adaptive hp finite element Meshes, SIAM Annual Meeting, Toronto, CA, July 1998.
69. Patra, A., Progress on Domain Decomposition Solvers For Adaptive hp finite element Meshes, SIAM Annual Meeting, Toronto, CA, July 1998.
70. Patra, A., and D’Souza, K. Finite Element Analysis and Simulation of Dental Implants Including a Novel Model for Trabecular Bone Fatigue, XIIIth U.S. National Congress on Applied Mechanics, Gainesville, Florida, June 1998.
71. Patra, A., Domain Decomposition Solvers for Transient Incompressible Navier-Stokes Equations, at Xth International Conference on Domain Decomposition Methods, Boulder , Colorado, August, 1997.

72. Patra, A., Fast Solvers for Adaptive hp Finite Element Methods Eighth SIAM Conference on Parallel Processing Minneapolis, March, 1997.
73. Patra, A., Parallel Adaptive hp Finite Element Methods – Solution Algorithms and Applications to Approximations of Navier-Stokes Equations at Fourth U.S. National Congress on Computational Mechanics San Francisco, August 1997.
74. Patra, A., Newton-Krylov Solvers for Adaptive hp Finite Element Analysis of the Incompressible Navier-Stokes Equations, at IX th International Conference on Domain Decomposition Methods, Bergen, Norway, June, 1996.
75. Patra, A., Preconditioners for Adaptive hp Finite Element Approximations of Stokes Equations at Third U.S. National Congress on Computational Mechanics Dallas, August 1995.

Technical Reports

- Patra, A.K., Pehlivanov, A., Littlefield, D., Carey G.F, Oden, J.T., Application of Error Indicators and Local Adaptive Refinement for Elasto-Plastic Impact Calculations (EPIC), CEWES MSRC/PET TR/99-31
- Edwards, C., P. Geng, A. Patra, and R. van de Geijn, Parallel matrix distributions: have we been doing it all wrong?, Tech. Report TR-95-40, Dept of Computer Sciences, UT-Austin, 1995.

Selected Invited Presentations

- Modeling Geophysical Mass Flows – Mesh(free), Model and Parameter Adaptivity, Enabling Model Based Predictive Science and Engineering, Computational Infrastructure for Geodynamics Workshop on Computational Sciences for Geodynamics, Austin, TX, October 16-18, 2006
- Modeling Geophysical Mass Flows Using the TITAN toolkit, Department of Mechanical Engineering, University of California at Berkeley, Berkeley, February, 2006.
- Computational Modeling of Hazardous Geophysical Mass Flows, keynote address at International Conference on Engineering Technology, Bhubaneswar, December, 2004.
- TITAN2D - A New Simulation Tool for Dry Granular Avalanches, Department of Mathematics, Indian Institute of Technology, Mumbai, October 24, 2003
- Goal Oriented Error Estimates for Adaptive Lagrangian Simulations of Hypervelocity Impact, Dept. of Mechanical Engineering, Louisiana State University, February, 2002.
- Domain Decomposition Based Efficient Portable Solvers for Multiple Architecture and Adaptive Grids, Workshop on Domain Decomposition, ETH, Zurich June 2001.

- Supporting Adaptive Computations on Hierarchical Memory Systems, Brown University, April, 2001.
- Finite Element Modeling and Applications to Dental Implants Dept. of Periodontology, School of Oral Sciences, University at Buffalo, December, 1999.
- Partitioning Adaptive hp Meshes, Workshop on Graph Partitioning – Past Present and Future, Army HPC Research Center, University of Minnesota, Minneapolis, October 1999.
- Error Indicators for Adaptive Lagrangian Simulations of Impact Mechanics, Specialty Workshop on Adaptive Grids, CEWES-TICAM, Austin, March, 1999.
- Parallel, Adaptive Finite Element Methods – New Data management and Solution Strategies, Department of Mechanical Engineering, University of Michigan, October 1998.
- Partitioning and Solution Methods For Adaptive hp Finite Elements Workshop on Unstructured Mesh Generation and Partitioning Army HPC Research Center, University of Minnesota, Minneapolis, October 1997.
- Parallel Adaptive hp Finite Element Methods, Dept. of Mathematics, University at Buffalo, September, 1997.
- Parallel, Adaptive Finite Element Methods, Workshop on Parallel Unstructured Grid Methods, Argonne National Labs., Chicago, September 1996.
- Stable Parallel Iterative Solvers for Adaptive hp Finite Elements Department of Mathematics, University of Maryland Baltimore County, April, 1996.
- Infrastructure Requirements for Parallel Adaptive Finite Element Methods Workshop on Parallel Computational Infrastructures, TICAM/HPCF, University of Texas-Austin, April, 1996.