

mechanics

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mechanics

mechanics provides its readers with news in the field of theoretical and applied mechanics, and serves as a forum for the presentation and discussion of issues related to the development of the science and profession of mechanics. Opinions expressed are those of the authors and do not necessarily reflect official points of views of AAM or the institutions with which the authors are affiliated.

Editor: Horacio D. Espinosa (Purdue University, U.S.A.)

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The *American Academy of Mechanics* is a non-profit corporation incorporated in 1969 under the laws of the Commonwealth of Pennsylvania. Its objective is to advance the science and profession of mechanics, with particular reference to the countries of North, South, and Central America. It aims to facilitate cooperation among mechanicians, to encourage recognition of achievements in mechanics, and to promote public understanding of the work of the mechanician.

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American Academy of Mechanics
Academia Americana de Mecánica

AWARDS

Professor Ted Belytschko of Northwestern University (Member, NAE) was awarded the Theodore von Karman Medal of the American Society of Mechanical Engineers in June 1999. His citation was: For his contributions to engineering mechanics, particularly the development of explicit finite element schemes and their application to large deformation problems such as failure analysis and vehicular crash simulations, the development of hourglass control methods, co-rotational finite element formulations, mixed time integration, and the pioneering work on mesh-free methods.

Prof. Charles R. Steele of applied mechanics at Stanford University, has been honored by ASME International. He is being recognized for leading research accomplishments in solids mechanics and pioneering analytical work in the biomechanics of the inner ear. He has received the Society's Warner T. Koiter Medal.

Steele has made many contributions to the theory of shells. He has synthesized his asymptotic solutions with finite element concepts to develop computational procedures for problems of shell intersections that are accurate, general and widely used in engineering practice. His insight into the behavior of shells provided the stepping stone for his work in modeling and explaining hearing mechanism.

Among his seminal contributions, Steele developed the first truly three-dimensional model of the cochlea. His work on this and the basilar membrane are at the forefront of the field. He is also working on the complicated motions of the tympanic membrane, commonly known at the eardrum, using analytical methods. Steele has been involved in the development of a noninvasive technique for determining the mechanical characteristics of bone by measuring its vibrational response. This approach has been used in a range of applications, from examining the effects of osteoporosis on the strength and stiffness of bones to more fundamental investigations on the effects of geometry and bone mineral distribution on the structural integrity of bone.

The morphogenesis of plants is another area Steele researched. The first strong evidence that the pattern formation in plants is governed by the elastic stability of the surface in the growth region was obtained in 1996. Steele received his bachelor's degree in mechanical engineering at Texas A&M, College Station, in 1956. He earned his doctorate in engineering mechanics at Stanford University in 1960.

Steele has published 88 scholarly articles in archive journals and has produced a host of subsidiary reports, articles and surveys. He is editor-in-chief of the *International Journal of Solids and Structures*.

A Fellow of ASME, Steele is also a Fellow of the American Academy of Mechanics. His honors and awards include a Certificate of Recognition from the National Aeronautics and Space Administration (1987) for bone tissue analyzer and method; the Humboldt Senior Fellowship Award from Germany (1994); an honorary doctorate from Zaporozhye State University, Ukraine (1997); and Eminent Academician of the Ukrainian Academy of Higher Education (1998).

American Academy of Mechanics
Founders Prize and Grant
Up to \$10,000 For the Academic Year 2000-2001
(Deadline: July 1, 2000)

The American Academy of Mechanics is pleased to announce the availability of a Founders Prize and Grant to be awarded in September 2000 to a doctoral candidate in the field of Mechanics. Funding has been arranged by the Robert M. and Mary Haythornthwaite Foundation through the good offices of Professor Haythornthwaite, founder and first President of the Academy. The award will be made on the recommendation of an AAM committee. The Prize consists of a Certificate and \$1,000 that will be presented at the annual meeting of the Academy, usually held in November. The Grant will be made to that same person in two installments, \$6,000 in September 2000 and up to \$3,000 in January 2001, the latter dependent on the size of the approved budget and receipt by the AAM committee of an acceptable progress report. In order to encourage contestants to think constructively about the impact of new and pending developments, they will be asked to compose an original essay of no more than a thousand words under the title "Progress through Mechanics". The winning essay will be published in mechanics. The award is open to those who, as of July 1, 2000, are registered as graduate students at a degree granting institution within the Americas, have completed at least one year of full-time graduate study at that institution, have been assigned a thesis advisor at the institution and have had a doctoral thesis topic emphasizing mechanics approved by the institution following candidacy or equivalent procedures. There are no restrictions with regard to citizenship, residency, race, religion or sex. Letters of support will be required of the thesis advisor and in addition one from either a Member or a Fellow of AAM. Contestants will be judged on the basis of the essay, plans, references and academic history. The intent of the Grant is to support the research of the student through an approved combination of equipment purchases, information access, travel, etc., but not routine living expenses or fees. Detailed rules for the competition will be issued soon: to receive them, express your interest to the committee by FAX to (215) 204-6936, or by writing to:

AAM Founders Prize and Grant Committee
c/o Civil and Environmental Engineering Department
Temple University (084-53)
Philadelphia, PA 19122

OBITUARIES

John Martin

John Brand Martin, a Deputy Vice-Chancellor at the University of Cape Town and a well-known figure in the Mechanics community, died suddenly on October 7th , 1999, aged 62 years.

John Martin was born on April 20th, 1937 in Durban, South Africa. After graduating cum laude with a Bachelors degree in Civil Engineering from the University of Natal in Durban, he pursued doctoral studies at Cambridge University. As a student at Cambridge, John was strongly influenced by the group of researchers led by Sir John Baker, and which included Jacques Heyman, his graduate adviser. This group had pioneered the application of plasticity theory to the problems of structural design, and it was here that John Martin was introduced to plasticity as a branch of mechanics. He was awarded a PhD degree in 1962 for a thesis on the topic of rigid-plastic frames and grids.

After Cambridge, John Martin moved to Brown University, and joined the Division of Engineering as a Visiting Assistant Professor. A tenure-track post soon followed, and by 1968, at the age of 31 years, he had attained the rank of Full Professor.

The plasticity group at Brown was bigger than that at Cambridge, and more diverse in its interests. It was in this group that John Martin found his intellectual home, amongst esteemed researchers of the calibre of William Prager, SR Bodner, DC Drucker, and PS Symonds; among the younger Faculty were J.W. Duffy, M.E. Gurtin, E.T. Onat, A.C. Pipkin and R.T. Shield, and this powerful group was to be joined a few years later by other mechanicians who would add further lustre: R.J. Clifton, L.B. Freund and J.R. Rice.

John Martin's initial research at Brown was in the area of rigid- plastic structural dynamics, in which area he worked closely with Paul Symonds. During his ten years at Brown he opened up two essentially new branches of theory underlying approximate approaches to inelastic problems in dynamics: the first class of methods was introduced by his discovery of remarkably simple and elegant theorems for obtaining upper bounds on the displacements in an impulsively loaded structure, and lower bounds on the duration of the response. The second concerned what subsequently became known as mode approximation techniques, which provide an ingenious means for estimating the deformation in a body by making use of simpler, modal solutions. John Martin's magisterial works in these areas are today regarded as milestones in the history of plasticity theory.

John shared a successful and very fruitful collaboration with Alan Ponter and Fred Leckie during the period 1968 - 1970, during which time a number of articles were written by this group on topics which included extremum principles for inelastic materials, creep rupture, and dual energy theorems.

Given John's rapid rise at Brown, his decision to return to South Africa in 1973 came as a surprise to many. South Africa was becoming further isolated and was the subject of intense criticism from the world community as a result of the policy of apartheid. However, he was driven by altruistic considerations, and wished to contribute, as best he could, to his country's future. He assumed the Corporation Chair of Civil Engineering at the University of Cape Town, or UCT as it is widely known, in January 1973, and embarked on the second phase of his career, in which he brought about fundamental changes to Engineering at UCT. Guided by his belief that the fundamental aspects of engineering science are vital to the future development of engineering as a discipline and a profession, John Martin undertook a comprehensive transformation of the curriculum, at the

same time promoting research activity in an environment in which research had not been a high priority. He established a vibrant research group, and attracted many graduate students, who worked with him on topics such as minimum principles, the relationship between thermodynamics and plasticity, and in the general area of rigid-plastic dynamics. By the late 1970s his first works on internal variable theories of inelastic material behaviour started to appear; this was to become an enduring theme in his research.

In 1975 the monograph "Plasticity: Fundamentals and General Results" by John Martin was published by MIT Press. It is a monumental work of more than 900 pages, and served as a fine example of his mastery of the subject, and of the extent to which he had contributed to its development.

By the 1980s John had become Dean of Engineering at UCT, but was no less active a researcher. His Centre for Research in Computational and Applied Mechanics at UCT had, by 1989, been accorded a special status by the Foundation for Research Development (the equivalent in South Africa of the NSF) as result of the high quality of its work and its importance as a national asset.

John Martin turned increasingly towards problems of a computational nature within the area of inelastic material behaviour, and by the early 1990s was devoting a considerable amount of his attention to the development and analysis of algorithms for solving these classes of problems. Much as he had approached his early work at Brown, he looked beyond the mere construction of effective algorithms and sought instead to understand the fundamental reasons underlying the behaviour of these algorithms. His work was, like much of his earlier contributions, characterised by elegance and the use of simple but powerful and incisive arguments.

John's health received a major setback in 1991 when he suffered kidney failure. Two unsuccessful kidney transplants followed. Undaunted by these major medical problems, and contrary to the expectations of many that he would start to "slow down", he sought, and was offered, the position of Deputy Vice-Chancellor at UCT in 1996. This is a senior executive position, and he was responsible for the major portfolios of research and human resource development. Three years later, having served with distinction in this position, John Martin collapsed and died at the university about which he cared so much, and to which he had given a great part of his life.

John Martin received many honours during his lifetime. He was a Fellow of the American Society of Civil Engineers and of Mechanical Engineers, and of the South African Institution of Civil Engineers. He was Fellow of the Royal Society of South Africa, and in 1990 received its John F.W. Herschel medal, which recognises outstanding scientific achievement. He was awarded two honorary doctorates, one from his alma mater Natal University in 1995, and another by UCT, in June 1999.

John was a modest and reserved man who shunned the limelight, and who tended to be embarrassed by the many accolades that came his way. He was an immensely generous person, to both colleagues and students, and earned the deep respect and affection of many. We mourn the loss of a great scholar, gentleman and loyal South African. He is survived by his widow Jill, their three sons Neil, Andrew and Peter, and two grandsons.

Daya Reddy
Cape Town
November 7th, 1999



DUKE UNIVERSITY
Professor Civil and Environmental Engineering

The Department of Civil and Environmental Engineering (<http://cee.egr.duke.edu/>) welcomes applications and nominations for a faculty position at the assistant professor level or at the tenured full professor level in any of the broad areas of research in the department, which include solid, soil, and structural mechanics, environmental engineering, and water resources. Among the departments current emphasis areas are computational mechanics, smart materials and adaptive structures, environmental mechanics, contaminant transport hydrology and remediation strategies, water and wastewater treatment, and pollution control, but any field that might complement or interface with these will also be encouraged. Regardless of research area, the successful candidate will be a scholar who will be expected to develop a funded research program of high quality and distinction while teaching at both the undergraduate and graduate levels. In addition you will serve as a full member of a university community in which interdisciplinary activity and broad dissemination of research results are encouraged. Letters of application should include a curriculum vitae, a summary of current and proposed research programs, and the names and addresses of three references. Applications and nominations should be sent, preferably by December 31, 1999, to:

Henry Petroski, Chairman,
Department of Civil and Environmental Engineering,
Duke University,
Box 90287, Durham, NC 27708-0287.

Duke University Is An Equal Opportunity/Affirmative Action Employer

University of Nebraska-Lincoln
Department of Engineering Mechanics
Faculty Position in Solid Mechanics and Dynamics

The Department of Engineering Mechanics, University of Nebraska-Lincoln, invites applications for a tenure track position at the Assistant Professor level. Exceptional qualified and experienced candidates may be considered for a higher rank. Primary consideration will be given to applicants having a strong foundation in broad areas of solid mechanics and dynamics. A doctoral degree in Engineering Mechanics or closely related area in engineering or applied mathematics is required. The successful applicant must have potential for teaching at both the undergraduate and graduate level and for developing an externally funded research program. Proficiency in English, both written and oral, is essential. Candidates for a higher rank must demonstrate a sustained record of success in terms of research publications, external funding, and teaching. Send a letter of application, and a curriculum vitae including names, addresses, and telephone numbers of at least three professional references to

Dr. S. I. Chou, Chair,
Faculty Search Committee,
Department of Engineering Mechanics,
W317.4 Nebraska Hall,
University of Nebraska-Lincoln,
Lincoln, NE 68588-0526.

Applications received before January 7, 2000 will be given primary consideration; however, later applications will be considered until the position is filled or closed. UNL is committed to a pluralistic campus community through Affirmative Action and Equal Opportunity and is responsive to the needs of dual career couples. We assure reasonable accommodation under the Americans with Disabilities Act; contact M. F. Beatty, Chair, Department of Engineering Mechanics at 402-472-2377 for assistance.

The 20th IUTAM Congress
ICTAM 2000, Chicago
August 27 - September 2, 2000
<http://www.tam.uiuc.edu/ICTAM2000>

The Congress, ICTAM 2000, was invited by the U.S. National Academy of Sciences upon the recommendation of the U.S. National Committee on Theoretical and Applied Mechanics. A consortium of universities will host the meeting. The Congress venue is the Chicago Marriott Downtown conference hotel. President of ICTAM 2000 is Prof. Hassan Aref of the University of Illinois at Urbana-Champaign. The Chicago Marriott Downtown conference hotel is located in the heart of Chicago, Illinois, along North Michigan Avenue's famous "Magnificent Mile", not far from the "The Loop" and the confluence of the scenic Chicago River and majestic Lake Michigan. International travelers to Chicago are generally served by Chicago-O'Hare International Airport.

Congress participants are encouraged to submit a paper. Papers are sought for all Pre-Nominated Session topics, the Mini-Symposium topics, and related areas. If none of the Pre-Nominated or Mini-Symposium topics seem suitable, the prospective author is encouraged to state a new topic name or provide relevant keywords. The paper must be in English, and should present material that is novel and preferably unpublished at the time of the Congress. All papers presented at the Congress are by invitation based on the recommendation of the International Papers Committee, which is appointed by the Executive Committee of the Congress Committee of IUTAM. No author will be invited to present more than one paper. Prospective authors are asked to submit only one paper for consideration. Submission of a paper requires two steps:

1. Electronic submission of a brief Abstract, and
2. Mailed submission of an Extended Summary

The Abstract and the Extended Summary must reach the Secretary-General no later than **Monday, January 17, 2000**. They may be submitted anytime *after* July 1, 1999. Format requirements are given in the web site of the congress.

Contributors will be informed of the decision of the International Papers Committee, and on the assignment of their paper to a session, by May 1, 2000. The presenting author of a paper invited for presentation is expected to register and present the paper at the Congress.

For more information visit the ICTAM 2000 web site at
<http://www.tam.uiuc.edu/ICTAM2000/>

STLE announces new conference CONDITION MONITORING 2001

Conference and Exhibition
February 24-28, 2001

In a response to a growing international interest in oil condition monitoring, the Society of Tribologists and Lubrication Engineers (STLE) is sponsoring a new conference and exhibition targeted to end users of lubrication products and all those interested in condition monitoring. The event will be held Feb. 24-28, 2001 at the Adam's Mark Hotel, San Antonio, Texas.

Called Condition Monitoring 2001 Conference and Exhibition, the event will include plenary sessions with world-renowned speakers, education courses on condition monitoring and basic lubrication, technical sessions on a variety of subjects, and exhibits of the latest testing equipment, services, and products serving the industry.

In addition, a special escorted tour will be available of the Southwest Research Institute facilities, just outside San Antonio. The institute has one of the most modern and extensive research laboratories in the United States.

Other sponsoring organizations include the University of Wales at Swansea and the Joint Oil Analysis Program (Department of Defense).

Certification exams for Oil Monitoring Analyst (OMA), levels I and II, will be offered during this event. The OMA courses and exams are the newest certification offerings from STLE. To date, these have proved to be very popular with individuals and companies especially those concerned with cost effective approaches for ISO 9000 standards.

This conference will also offer the popular Commercial Marketing Forum sessions. These are 20-minute sessions at which companies can present details on their latest product or service. An interactive question and answer session is part of the typical Forum session. These sessions have grown in popularity in the last several years at the STLE Annual Meeting.

"This conference and exhibition is being staged in one of the most exciting destinations in the U.S.," cites Michel Murphy, Vice President at Large for STLE and one of the conference organizers. "San Antonio is not only a world class tourist destination, it is also right in the heart of oil country - the great state of Texas-so it is particularly convenient to individuals and companies throughout the Southwest and Mexico."

"The mission of this conference will be to provide education and certification to lubrication end users on the best practices in the field," Murphy added.

Attendees are also encouraged to bring their families to take advantage of the many tourist attractions and social activities in and around San Antonio. One of the most famous, of course, is the Alamo, which was the site of a famous battle during the Texas war for independence.

For more information on the conference or to be sure you receive future mailings, contact STLE headquarters at Phone: 847-825-5536 USA, Fax: 847-825-1456, E-mail: information@stle.org or regularly visit the STLE web site at <http://www.stle.org>.

AACE International's 44th Annual Meeting

June 25-28, 2000

Plan now to visit the spectacular Canadian Rockies and the cosmopolitan city of Calgary at a joint meeting of AACE International and ICEC, the International Cost Engineering Council, on June 25-28, 2000.

An extremely powerful technical program is planned, featuring world-class presentations on technical subjects matters covering all aspects of the cost engineering profession. Scheduled presentations include *Constructability: The Key to Reducing Investment Risk*; *Project Services for the New Millennium*; *Cost Management in Lean Manufacturing Enterprises*; and *Process Cost Engineering and the 21st Century*, along with many other presentations. The seven concurrent technical tracks, plus the Software Fair, will be offered over the 4 days of the Annual Meeting. Cost managers, cost engineers, planners and schedulers, project managers, value engineers, estimators, and others in the cost engineering profession are encouraged to attend. now is the time to budget for, seek corporate funding of, and authorization to attend the June 25-28, 2000, Annual Meeting. Mark your calendars now.

The 2000 meeting is expected to be one of the strongest technical programs that AACE has offered. The presentations will feature the latest, leading-edge technology. Participants will be receiving skills and techniques they can take back to their jobs, allowing better performance of day-to-day job tasks. The Annual meeting also is an opportunity to network with your peers and to see what others are doing to solve complex technical problems in cost management. leading experts will be making the presentations at the Telus Convention Centre in downtown Calgary. The theme of the 2000 Annual Meeting is *Cost Engineering: Advancing Project Performance in the Global marketplace*. All attendees will receive a bound copy or a CD of the 2000 AACE International Transactions at the meeting. Also, this year there are plans to offer poster sessions in the exhibit hall in an effort to accommodate the large number of presenters.

In addition to the extensive technical presentations, there will be a special track on the fundamental skills of the cost engineering profession. This track of skills and knowledge presentations is an excellent source of information for those new to the profession, or for those wishing to diversify their skills. A complimentary **Skills & Knowledge Workbook** will be handed out in these sessions.

Cooperative agreements with AACE International enable members of ASPE, ISPA, NAWIC, PCEA, PMI, SAVE International, and SCEA to attend for the same rates as AACE International members. Those who register by May 31, 2000, for the 3-day technical meeting will receive a reduced "early bird" fee. Discounts also are available for government employees.

For more information on registering as an exhibitor at the 2000 ACE International Annual Meeting, please contact,

Sean Soth, network Publications Inc., Hunt Valley, MD.
phone 410-628-0390, extension 108/ fax: 410-628-0398
e-mail: ssoth@networkpub.com

For more information on AACE International, please contact:

AACE International
209 Prairie Avenue, Suite 100
Morgantown, WV 26501, USA
Phone: 800-858-COST or 304-296-8444/ fax: 304-291-5728
e-mail: info@acei.org
or visit our website at <http://www.acei.org> or www.cost.org



**VISIT the AAM Website at
<http://www.purdue.edu/AAM>**

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| 609 | Crack growth in the gigacycle fatigue regime for helicopter gears | Ritchie RO. Davidson DL. Boyce BL. Campbell JP. Roder O. |
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