



Bio

Bioengineering Division Newsletter

Christopher R. Jacobs, Editor

Fall 2001

Chair's Message



Noshir Langrana

This past year has been a great honor to be the Chair of the Bioengineering Division. It is a great pleasure to report that BED continues to thrive, in its role as the ASME's leading Division for disseminating, educating and fostering bioengineering research.

You may know the history of this division, it started as the Human Factor Division, established in 1948, and then it became the Bioengineering Division in the seventies. That is, the division is about thirty years old; in this time period we have made giant strides in our division. The Lissner award was established by the Bioengineering Division in 1977, it operated as a division award until 1987 when it was elevated to a Society award. The YC Fung award was established by the Bioengineering Division in 1985 and operated as a division award until 1998 when it was elevated to a Society award. The custodial funds of BED are enjoying all time high balance, thanks to our bold initiatives to establish and conduct our own summer conference, one of the outcomes is the successful endowment of both HR Lissner Award and YC Fung Award. Our custodial account is at an all time high.

Biomechanical Engineering continues to capture the fundamental biomechanics research that will drive the next age of biomedical Engineering. Biomechanics

research has increasingly included both bioengineering and bioscience specialists and can be viewed by both as the primary link for fundamental biomechanical engineering research, specifically in the emerging areas of cellular and molecular biomechanics.

The scientific programs, as usual, have been strong. Every odd year, we have IMECE and Summer Conference. These two conferences demand a significant amount of time from our committee members. Their efforts need to be recognized. The BED program committee (Ajit Yoganathan, chair, Jennifer Wayne, secretary, Ted Conway Program Representative for 2000-IMECE) and Summer Conference Committee (Roger Kamm, Chair, Geert Schmid-Schonbein, Program, Chair, Louis Soslowsky, Local Arrangement, Gerard Ateshian, Information, and Samir Hefzy, Publication) did superb work from reviewing submitted abstracts, putting together well-structured sessions, to the final organizations. Logistically, all events worked smoothly at all stages; thanks to the efforts of BED members and ASME support staff. We owe a round of thanks to Gerard Ateshian, our information chair, for bringing BED to 21st century on-line web-based technical program activities. We also owe another round of thanks to David Butler, our finance chair for doing a great job and maintaining our budget almost under control.

In the very recent past, 2001 Summer Bioengineering Conference attracted the highest attendance, demonstrating its growing eminence as a forum for bioengi-

Editor's Message

It is a great pleasure to bring you this year's BED Newsletter. As in the previous two years that I have been the Newsletter editor, the BED continues to grow at an astonishing rate in terms of members and activities. As a result, there is a sizeable amount of ground to cover and limited space to do it in. In addition to the standard reports from the technical and administrative committees, there are several notable events that occurred in the last year that I would like to bring to your attention. Immediate past and future BED technical meetings include the very exciting, but expensive, Summer conference in Snowbird. This meeting featured a world class array of keynote speakers, and an informative set of morning tutorials on biological techniques for engineers that received uniform high praise. Summaries of the 2000 and 2001 IMECE's with emphasis areas of Tissue Engineering and Nanotechnology are also included. Also, remember the deadline for submissions to the 2002 IMECE will be here sooner than you realize. The accomplishments of several BED members were recognized, including the Lissner, Fung, Skalak, and Thurston awards and an ASME Dedicated Service award to a BED member, John Chato.

For some time our field has been involved in research in the influence of mechanics on the behavior of biologic systems at the tissue and cellular level. Cell and Tissue engineering has found an effective peer outlet in both our meetings

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neering. At this conference, for the first time, four early morning tutorials on the Biological techniques for Bioengineers were held and they attracted an excellent turnout of participants. The 2000 IMECE in Orlando had the highlight topic of tissue engineering. The ASME publication department has authorized the increase in the total number of pages for the journal of Biomechanical Engineering, which has shown the steady growth and it has been successful with high quality papers and special issues. The BED web site has been a very necessary addition to all of our activities. The conference organization has become more efficient with this new tool. The conference submission, review, organization, and announcements have been performed using this web site. Finally, the annual Bioprocess seminars continue to be successful. The 13th annual conference was held in San Diego, California with the focus on the latest advances in the field of biotechnology.

While maintaining its pre-eminent position at traditional macro scales, BED should facilitate research dissemination in the rapidly emerging interface of bioengineering and bioscience, particularly at cellular and molecular scales. This requires outreach beyond our engineering disciplines, and includes soliciting invitations of bioscience researchers at our biomechanics-oriented meetings. BED has been very active in this regard. BED has established a new technical committee called Cellular and Tissue Engineering to meet the demand from our members. Farshid Guilak chairs this committee. Secondly, at the Snowbird Utah Summer Bioengineering Conference, four keynote sessions were held featuring prominent speakers from outside of ASME, distinguished researchers, who provided new and in-depth insight on cutting edge technologies. They were (i) Dr. Peter Hunter from University of Auckland, a lecture on "Electromechanics of the heart: from cell to tissue properties to the intact Organ", (ii) Dr. Michael P. Sheetz of Columbia University, a lecture on "Force transduction in cell mobility", (iii) Peter Walker of Cooper Union, the Calvin W. Rice Lecture on, "Prospects for Advances in Total Knee Replacement", (iv) Dr. Steven Chu from Stanford University, a lecture on "Looking at Biomolecules: Move One at a Time".

One of the challenges BED faces is the attendance and interest at IMECE conferences in November. This is specifically true following the Summer Bioengineering Conference in July. The number of technical sessions remains about constant but the number of attendees was not high. Towards this issue, at Orlando IMECE-2000, the theme of the conference was Tissue Engineering. David Butler and Robert Nerem organized the technical symposium on "Functional Tissue Engineering". The

program featured eight leaders from industry to discuss different aspects of tissue engineering. They include Mark Applegate and Dawn Applegate (Advanced Tissue Science), Fred Cahn (Integra Life Science), Dale Devore (Collagenesis), Joel Cummings and John Hefferman (Genzyme), Nancy Parenteau (Organogenesis) and James Siegler (Curis Inc.). The symposium had the right mix of academic and industry people who offered unique perspectives on the future of tissue engineering. The highlight symposium for IMECE 2001 in New York City is Nano-Technology and Bioengineering Education. The BED education committee is working hard to develop this new very needed activity within BED. In summary, the great efforts by our program and technical committees promise the great improvements in IMECE programs.

The Journal of Biomechanical Engineering continues to maintain high standards and is becoming a premier journal in Biomedical Engineering. The role of biomedical engineering is increasingly becoming more important as the next generation complex yet better tools are developed to probe the immense complexity of biology and as the amount of data expands to nearly incomprehensible volumes. Biomedical engineering principles and practices are increasingly integrated into biomedical research and medicine and they are better appreciated. The Journal must continue to capture the fundamental biomechanical engineering research that will drive the next century of bioengineering. Biomechanical engineering research will increasingly mandate a very close partnership of both engineering and bioscience specialists and therefore, the Journal must be appropriately accessible to both audiences and be viewed by both as the primary source for fundamental biomechanical engineering research. It is critical to strive to retain and enunciate bioengineering unique skills, approaches, and contributions of engineering, in order to maintain our identity. Dr. Kenneth Diller has performed an excellent job being the Technical Editor. Unfortunately, Ken has decided not to renew his term of office as the technical editor. The search committee was formed with Dr. Robert Nerem as the chair. At IMECE-2001 conference, the selection of the new editor will be announced. On behalf of BED Executive committee, I would like to express our gratitude to Ken Diller for increasing the impact of the journal in the bioengineering field.

A position statement was prepared by the ASME NIH-Bioengineering Task Force on the FY 2002 budget request for bioengineering funding at NIH. As the majority of you know the enactment of the National Institute of Biomedical Imaging and Bioengineering Establishment Act of 2000 (P.L. 106-580) established a separately funded direct support mechanism for bioengineering research at NIH. Along this line, the concerns about research funding

in bioengineering were expressed and several recommendations were made. The details on this statement can be obtained from our ASME Government Relations Representative May Legatski. A group of us met with the NINIB-acting director Dr. Donna J. Dean on April 23, 2001. The presence of BED members and the process for nominating Candidates to the NIBIB was discussed. This is an important issue and BED Executive Board needs to be involved in this program for future developments.

I have had a very satisfying and gratifying experience as the chair of BED. The division is pro-active and making all attempts to face the new challenges. We are a very vibrant group of researchers and educators. I have very high expectations from our division. The Executive committee is in good hand as Vijay Goel has become the chair and we have a great mix of senior and junior members in all technical committees. I am confident that the new challenges will be met and BED will flourish as it serves our needs. Thank you for giving me an opportunity to serve on the Executive committee.

Noshir Langrana, PhD
Chair, BED

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and Journal. To reflect this Farshid Guilak describes the Division's newest technical committee, Cellular and Tissue Engineering. This is clearly going to be a significant growth area among the new interdisciplinary approaches that characterize the field of bioengineering.

One of the most significant events in bioengineering in the last year is the formation of the National Institute on Biomedical Imaging and Bioengineering. This new institute is a reflection of the public perception of the importance of bioengineering. However, as with much of the activities related to bioengineering, there continues to be significant discussion of how best to support bioengineering advances. Whether we are considering an NIH Institute, an academic department, or a review panel, the recurring question seems to be, "Is bioengineering better off as a unit unto itself, or should it continue to cross the traditional disciplines?" As we continue to discuss, struggle, experiment, and implement, you will be happy to know that there remains a key voice in issues central to our field. The ICCFR&D met in Washington this year to official congressional commentary on the proposed federal budget, including the NIBIB. This provides critical feedback to congressional staffers from the scientific community, and represents a valuable service the BED provides its members.

Finally, this is my third and final newsletter as Editor, which carries a three-year term. I have found being the editor to

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be a rewarding and exciting experience with many opportunities to interact with the BED volunteer leadership and gain unique insight into issues in our field. If you might be interested in taking over the editorship, and I would strongly encourage you, please contact me by email (christopher.jacobs@stanford.edu).

*Christopher Jacobs
Newsletter Editor, BED*

BED Nanotechnology Focus for 2001 IMECE (November 11-16, New York, NY)

The focus of the 2001 International Mechanical Engineering Congress and Exposition is on Nanotechnology. Nanotechnology has far reaching implications to the field of health care technology. This year the Bioengineering Division of ASME would like to highlight sessions that are dedicated to the study of living tissue at the micro/nano scale and sessions dedicated to the engineering of micro/nano scale systems for health care applications.

Nano and Micro Mechanics (BED-9B)

Cell Mechanics (BED-10A)

Medical Applications of Microsystems (BED-16)

Barry Lieber

2001 IMECE BED Program Representative

ASME Member Chair of IOC Academy on Sport Sciences

Dr. Savio L-Y. Woo, the Albert B. Ferguson Professor and Director of the Musculoskeletal Research Center of the Department of Orthopaedic Surgery at the University of Pittsburgh, was recently appointed by Prince Alexandre de Merode, Chairman of the Medical Commission of the International Olympic Committee (IOC) to be the General Secretary for the prestigious IOC Olympic Academy on Sport Sciences. The membership of the Academy includes such notables as all four winners of the IOC Olympic Prize, Dr. Jeremy Morris (University of London, England), Dr. Ralph Paffenbarger (Stanford University), Dr. Woo, and Dr. John Holloszy (Washington University of Medicine in St. Louis) as well as Dr. Andrew Huxley, Nobel Laureate Dr. Vicomte Christian de Duve and other authorities in the field of sport sciences. The goal of the Academy is to chart the future direction of his ever-evolving field based on research and education. Other missions include handling of intramural efforts on timely research sponsored by the Academy as well as conducting consensus workshops and symposia on cutting edge topics in conjunction with the biennial IOC World Congress program.

BED Activities in Washington



The ASME Inter Council Committee on Federal R&D (ICCFR&D) FY 2002 Budget Review met on April 23-24, 2001 in Washington, D.C. The mission of the ICCFR&D is to strengthen the voice of the Mechanical Engineering Profession in the Federal R&D budget process. The members of this committee are the chairs of the ASME R&D related task forces. Each task force is composed of 3 to 5 members. This year, the members of the Bioengineering task force included: Mohamed Samir Hefzy, Chair, Noshir Langrana and James

Moore. The task force met during the ICCFR&D meeting and prepared a position statement on the FY 2002 Budget Request for the NIH. The statement was filed with the House and Senate Appropriations' Subcommittees on Labor - HHS and included comments related to funding the enactment of the National Institute for Biomedical Imaging and Bioengineering (NIBIB) Establishment Act of 2000 (P.L. 106-850) which established a separately funded direct support mechanism for bioengineering research at the NIH. The following are the concerns and the recommendations of the Bioengineering Task Force:

Concerns

- While the Bioengineering Division acknowledges that there is a small increase in the budgeted support for Bioengineering Research across NIH, it believes that continued increases will be necessary to meet the anticipated future explosion in Biomedical Engineering Research.
- The NIBIB will focus on developing new knowledge, creating new technologies, and training researchers able to fully integrate the quantitative sciences with biomedical research. To achieve those goals, the NIBIB will need adequate infusion of new monies as well as the transfer of appropriate current projects to its budget. It is also important that the newly created Institute's portfolio reflect a balance between imaging and engineering and that its Advisory Committee is populated in a manner to achieve a balance between radiologists and engineers.
- Breakthroughs in biomedical and biotechnology research are in large part dependent upon basic research conducted by the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE) and other physical science and engineering departments and agencies. Yet, the proposed FY 2002 budget provides flat or decreasing allocations of R&D in these critical areas, while providing NIH with a 13.5 percent increase.

Recommendations

- The Bioengineering Division strongly urges Congress provide increased funding of Bioengineering Research across NIH to meet the anticipated future explosion in Biomedical Engineering Research.
- The Bioengineering Division supports the FY 2002 budget request of \$40.2 million for the newly established NIBIB. A trans-NIH review committee is currently conducting an analysis of bioengineering and biomedical imaging research portfolios with the intent of recommending that some current projects be moved to NIBIB in the future, thus increasing NIBIB's baseline budget consistent with the authority contained in the enabling statute. Additionally, the Bioengineering Division urges that the composition of the to-be-established Advisory Committee of NIBIB be populated in a manner to achieve a balance between radiologists and engineers.
- While the Bioengineering Division supports increased funding of Bioengineering Research across NIH and within the NIBIB, it is concerned that support for federal research and development at other science and engineering mission agencies is not keeping pace with support for R&D in the life sciences. The Bioengineering Division, therefore, urges Congress to balance the nation's R&D portfolio by increasing federal funding of basic physical science and engineering research to provide the foundation for continued and future biomedical breakthroughs.

Mohamed Samir Hefzy, Ph.D., P.E.

ASME Distinguished Service Award to John C. Chato



John C. Chato

committees, including the Honors Committee and Lisner Award Committee.

Professor John C. Chato was presented the ASME Distinguished Service Award at the 2000 IMECE in recognition of his many years of contributions to the society, and in particular to the Bioengineering Division. John was a pioneer in developing fundamentals and applications in bioheat transfer and in leading the ASME to become the primary venue in the world for dissemination of research in this area. In this context he has mentored two subsequent generations of bioheat transfer researchers with an impact that has reached around the world. John has also served the Bioengineering Division with distinction including membership on and chairing the Executive Committee and numerous other division

Technical Committees

Solid Mechanics Committee

The Solids Mechanics Committee continues to have a strong membership pursuing state-of-the-art engineering and interested in sharing their knowledge with the community. Our members supported outstanding sessions at two conferences this year, the 2000 IMECE in Orlando, Florida and the 2001 Summer Bioengineering Conference in Snowbird, Utah. Both of these were great successes for our Committee and were well attended. Our special thanks to many members of the Bioengineering Division for the considerable amount of work that went into organizing these conferences and publishing the proceedings. The Committee also enjoys successful collaborations with the Bioengineering Division's Fluid Mechanics Committee and the Design/Rehabilitation Committee in sponsoring joint sessions/symposia for conferences.

For the 2000 IMECE, the Solid Mechanics Committee sponsored 12 sessions. These sessions covered a wide range of topics, including Soft Tissue Mechanics, Bone Mechanics, Knee Mechanics, Impact Mechanics, Vehicular Mechanics, Computational Biomechanics, and Kinematic Analysis. The Committee was also a major participant in the outstanding Tissue Engineering Symposium (7 sessions) which gathered top-notch investigators from industry and academe world-wide.

The 2001 Summer Bioengineering Conference was a tremendous success, with the Solid Mechanics Committee sponsoring 29 podium sessions and numerous poster presentations, which constituted over half of the entire meeting. These covered such topics as Soft Tissue Mechanics, Bone Biomechanics, Orthopaedic Biomechanics, Computational Biomechanics, Spine Biomechanics, Brain Biomechanics, Vehicular & Pediatric Biomechanics, and Joint Mechanics. A new element was added to the Conference - tutorials - this year on Biological Techniques for Bioengineers and presented over the course of four mornings. The tutorials were well attended and well received.

Additionally, the Committee is preparing for the 2001 IMECE in New York, New York. Preliminary programming includes sessions on Soft Tissue Mechanics, Bone Mechanics, Implant Biomechanics, Nano- and Micro-mechanics, Cell/Tissue Engineering, Cartilage Mechanics, Spine Mechanics, Vehicular & Pediatric Biomechanics, and Joint Biomechanics. The Committee will also highlight an industrial session on Implant Technology. The Committee is very excited to sponsor joint sessions with the newly formed Cell and Tissue Engineering Committee and continue sponsoring sessions with the Fluid Mechanics Committee.

Our thanks to all the members of the Solid Mechanics Committee who have participated in the activities of this Committee. If you would like any other information on the Solid Mechanics Committee, please contact Jennifer Wayne (804.828.2595; jswayne@vcu.edu).

Jennifer Wayne, Chair
Farsh Guilak, Past Chair

Fluid Mechanics Committee

The BED Fluids Technical Committee has evolved in response to the ever-changing research landscape in the biofluids area. Advances in computational technologies and the biology revolution have affected our research, and thus our committee's activities, in profound ways. Judged by the wide variety of high-quality research presented at the recent Summer Bioengineering Conference in Snowbird, our membership is adapting quite well. Our job as a committee must continue to foster these advances by providing an appropriate forum in which new ideas and collaborations can be presented and discussed. We must also continue to reach out to other disciplines that can benefit from the tools our members have spent years developing.

As an indication of the activities in the field of biofluid mechanics, the numbers of sessions organized by our committee in Snowbird maintained the increasing trend from previous summer conferences. Many of the sessions had molecular, cellular or tissue applications as their theme.

Most of the rest of the sessions were problem based. I hope you will agree that this purposeful organizational strategy resulted in the best summer conference yet. I hope that we can continue this mode of organization at future meetings. This was also the first summer conference to feature commented poster presentations. As the popularity of the summer conference continues to grow, the use of poster sessions will likely increase. We must make sure that the quality of these sessions is sufficient to provide all authors with excellent exposure for their work. The use of panel discussions and other alternative session formats, particularly at the IMECE, is another way we can maintain the high quality of our conferences.

We have also made efforts to reach out to other technical committees within ASME and hold joint sessions. Many of the sessions at Snowbird were organized in cooperation with the BED Solids Committee. At the 2001 IMECE in New York City, we will hold a joint session with the Fluids Engineering Division on computational methods in biofluid mechanics. We also plan to work closely with the newly established Cell and Tissue Engineering technical committee in the future in this regard.

In order to track our success, we have made changes to our Standard Operating Procedure. We are gathering data on numbers of papers and sessions at conferences, session attendance, number of industry speakers, and number of fluids oriented articles in the Journal of Biomechanical Engineering as measures of our success. This information will help us determine which of our strategies are most successful, and will be used to guide future activities. I welcome input on other measures we might employ.

The next, most significant issue for the committee is to replace me as chair. Since taking over from Stan Rittgers three years ago, it has been my pleasure to serve as chair. While the organization of sessions can result in some late nights, I have found that the membership of this committee is always responsive to requests for help. The best part of this job is the interaction with the nicest people in the field. It is an extremely satisfying atmosphere in which to work. I would like to thank the membership for their help and collegiality.

James Moore, Chair

Cellular and Tissue Engineering Committee

The Bioengineering Division has recently formed a new committee on "Cellular and Tissue Engineering". Our meetings have seen a tremendous increase in activities in this area, with over 8 individual tissue engineering sessions (more than 43 papers) at the 2000 IMECE. The general areas of interest to the committee are cellular engineering, tissue engineering, cell mechanics, nano- and micro-mechanics, biomaterials, and other topics related to tissue growth, injury, repair and remodeling. In this respect, the Cellular and Tissue Engineering Committee is closely coordinating its activities with the Solid Mechanics and Fluid Mechanics Committees. For the 2001 IMECE, the committee will be sponsoring five sessions on Tissue Engineering, Cell Mechanics, and Nano/Micro-Mechanics. In future meetings, we will be developing novel sessions and topics that seek to cut across different committees and divisions.

The Cellular and Tissue Engineering Committee will also assimilate the responsibilities of the Biomaterials Committee, which was recently dissolved. Membership and interest in this new committee has been tremendous, but we are always looking for more members who have an interest in these areas. Anyone interested in participating in the Cellular and Tissue Engineering Committee is invited to contact Farshid Guilak at guilak@duke.edu.

Farshid Guilak, PhD, Chair

Design and Rehabilitation Committee: Looking for Members to Address New Challenges in Medical Device Design

The Design and Rehab Committee is looking towards helping develop a program that addresses the unique issues related to the design and evaluation of medical devices. The incorporation of tissue engineered hybrid devices, the changing regulatory environment and the economics of medical devices create new challenges for change in current medical device design processes. The committee would like to start by addressing future educational needs for training engineers to be successful in the medical device industry. I invite any one interested in this topic to attend our committee meeting (10:00am, Sunday, Nov. 11) at IMECE01 in New York. If you cannot attend the meeting, but are interested in participating or learning more about this activity please contact me directly at the address below.

The Design and Rehab committee is pleased to sponsor the following sessions at IMECE01 this November in New York: Joint Mechanics, Medical Device Design, Minimally Invasive Surgery and Sports Injury.

Look forward to seeing you in New York.
Tom Andriacchi, Chair

Education Committee

The first meeting of the technical committee will be at the 2001 Congress in NYC. We are coordinating session activities with the Biosolid mechanics committee and the K-17 Bioheat & Mass Transfer committees for the 2001 meeting. There are several BED related education sessions being prepared and presented. I anticipate asking a representative from all other technical committees within BED to serve as liaison members of the education committee. This would include Biosolids, Biofluids, K-17, Design, and Cellular and Tissue Engineering.

Gerald Miller, Chair

United States National Committee on Biomechanics (USNCB) Report

The United States National Committee on Biomechanics (USNCB) is a representative committee of a variety of organizations, including ASME. The committee has several Executive Committee members, as well as representative members from each of the representative societies. Essentially all of the USNCB Executive Committee members are active ASME members (e.g., effective July 1, 2001, Steve Goldstein will be Chair and Roger Kamm will be Vice-Chair).

In last year's report, it was noted that a USNCB sponsored Functional Tissue Engineering Workshop was to be held September 2000 in Tampa, Florida. Functional Tissue Engineering was adopted by the USNCB to emphasize the importance of biomechanical considerations in the design and development of cell and matrix-based implants for soft and hard tissue repair. This meeting was an outstanding success and a book titled "Functional Tissue Engineering: The Role of Biomechanics" (Eds.: F. Guilak, D. Butler, S. Goldstein, D. Mooney) will be published by Springer-Verlag early in 2002.

In addition, the USNCB is currently seeking ways to increase Industrial Relations, Educational Activities, and External Affairs. In particular, consideration of a new satellite biomechanics meeting was suggested. An update on these activities will appear in a subsequent newsletter.

If you have any questions about the USNCB, please feel free to contact Lou Soslowsky (soslowsk@mail.med.upenn.edu) or the Chairman of the US National Committee on Biomechanics, Dr. Steve Goldstein (stevegold@umich.edu).

Louis J. Soslowsky, Ph.D.
ASME Representative to USNCB

Membership Development and Information Committee

The Membership Development Committee is responsible for recruiting new members to the Division and supporting member activities. The Committee is pleased to report that the Bioengineering Division membership keeps increasing to 1931 ASME members with BED as their primary division. As for supporting member activities, Gerard Ateshian, previous chair of the Committee, overhauled the web site for the BED, providing an easy access to more information regarding BED and the various online ASME resources. The system for electronic submission of conference abstracts also has been set up in the web site. Several announcements for various conferences and a notice for Journal of Biomechanical Engineering were delivered to BED members through email. BED members' participation in the Membership Development and Information Committee is encouraged not only to maintain current activities but also to develop more activities, such as organizing social functions at ASME meetings and developing tutorials and workshops in methods of engineering research and practice of use to the members. Should you need additional information about the participation in the Committee, send an email to tlim@rush.edu. Also, if you need to renew or register your email address, feel free to contact Tae-Hong Lim.

Tae-Hong Lim, Chair

Finance Committee

The financial state of the Bioengineering Division (BED) remains strong. Our division is fortunate to now have a Finance Committee to identify new initiatives and to work to further improve the finances of BED. The custodian accounts of the Division remain stable. Although the recent 2001 Summer Bioengineering Conference was a real success in terms of participants and technical content, Snowbird was far more expensive than Big Sky. The Whitaker Foundation has provided its second year of support for our Student Paper Competition. These positive developments should permit the Division to explore new initiatives for growing and sustaining its membership.

A new Finance Committee is in place. Gerard Ateshian from Columbia University is now serving as our new Chair. Jennifer Wayne from Virginia Commonwealth and Rob Keynton from the University of Louisville will join Gerard on the Committee. I have agreed to stay on for one year during the transition. We are fortunate to have such excellent people join this committee and I know that BED will benefit from their contributions.

The BED maintains custodian accounts for the Bioengineering Division, the Bioprocess Engineering Subdivision, and the Bioengineering Division's Student Paper Competition. The first two accounts permit the Division to support the IMECE Meeting, the Newsletter, the Alliance with the American Institute of Medical and Biological Engineering, as well as recurring office and miscellaneous expenses. The third account supports the Annual Student Paper Competition at IMECE. All three accounts are healthy and should continue to support the Division's current and future needs.

The Summer Bioengineering Conference in Snowbird, Utah was a scientific success but also rather expensive to put on. The Division expects to generate only \$2,000-\$4,000 or less from the meeting, which is far less than was generated in Big Sky. The Snowbird Resort offered wonderful amenities but food and meeting facilities were extremely costly. Boscov Travel was enormously helpful in coordinating travel and registration for the meeting and Debbie and Linda from Boscov are to be especially thanked for solving various on-site problems. We had over 550 total attendees, an increase of approximately 10% from the 1999 meeting. We also thank Instron Corporation for supporting the reception at the beginning of the meeting. Finally, we must thank Lou Soslowsky and Dawn Elliott from the University of Pennsylvania for negotiating with Snowbird Resort and for holding expenses to reasonable levels as Local Arrangements Chair and Co-Chair, respectively.

The Whitaker Foundation has provided generous support for the Annual Student

Paper Competition. The foundation has sponsored awards and travel expenses for the finalists of the IMECE meeting for the past five years. We recently received our second of three years of support from a \$19,500 grant from the Whitaker Foundation. We thank Whitaker for sponsoring this valuable activity of the Division.

The Bioengineering Division will continue to identify and support new initiatives. The Finance Committee and the Executive Committee will discuss these new initiatives at the 2001 IMECE in New York. We welcome suggestions for further strengthening our programs. Finally, it has been a pleasure serving the BED as Finance Chair for the past three years.

David L. Butler, Chair

Honors Committee

The Honors Committee is responsible for administering the awards activities of the Bioengineering Division of ASME. These duties include the awarding of the ASME's H.R. Lissner and Y.C. Fung Young Investigator Awards, the BED's Richard Skalak Best Paper (ASME Journal of Biomechanical) and Student Papers (IMECE) Awards, Fellow Awards, and interacting with the Basic Engineering Technical Operating Board (BETGOP) in awarding the ASME Thurston Award and the Dedicated Service Award. For 2000, the Lissner Award was presented to Morton Friedman, Duke University, the Y.C. Fung Award to Farshid Guilak, Duke University, the Dedicated Service Award to John Chato, University of Illinois, the Skalak Best Paper to Barclay

Morrison III, David.F. Meaney, Susan S. Marguiles and Tracy K. McIntosh, (JBME, v. 122, 2000), University of Pennsylvania, and the Thurston Award to Duncan Dawson, University of Leeds.

*Peter A. Torzilli, PhD
Honors Committee Chair*

2000 IMECE Report

The weather was warm and gentle while the topics of discussion were "red hot" indicating another successful Bioengineering Division (BED) scientific program at the 2000 International Mechanical Engineering Congress and Exposition (IMECE) held at the Disney-world Swan and Dolphin Hotel and Resort in Orlando, Florida. We were able to combine the leisure activities that Central Florida provides with the opportunity to listen to state-of-the-art research and development in various areas of bioengineering. The BED program consisted of one panel discussion and 40 podium sessions where 190 papers were presented by private companies, government laboratories and universities from around the world. The theme for this year's IMECE was "Beyond Traditional Boundaries". The BED program highlighted this theme with such topics as the Tissue Engineering Symposium, Mechanics in Biology, Landmark Contributions in Bio-Heat Transfer and the Symposium on Functional Biomaterials.

The technical committees of BED (Biofluid Mechanics, Biomaterials, Biosolid

Mechanics, Design & Rehabilitation, Bio-Heat & Mass Transfer) organized several symposia as part of the program. Some of the sessions were jointly developed by various technical committees within BED as well as by other divisions within ASME. Three sessions on Mechanics in Biology appeared in the BED program with an additional 3 sessions in the Applied Mechanics Division (AMD) Program. Also, sessions in Vehicle Biomechanics and Impact Biomechanics appeared in the BED program with others in the AMD Program. The BioHeat/Mass Transfer papers were jointly developed by the BED BioHeat/Mass Transfer Committee and the Heat Transfer (HT) Division. A bioMEMS (Microelectromechanical Systems) session was coordinated with the MEMS Division. Many of these presentations have accompanying papers in other ASME publications.

This year's program also continued the sponsorship of the annual BED student paper competition, including categories for master's and doctoral level presentations. A large number of high quality papers were contributed, of which 12 were chosen to be finalists. The last round of competition was based on the podium presentations by the student finalists and awards were given at the Bioengineering Banquet. New Division Fellows and the Best Paper Award winners were also honored at the banquet.

Ted Conway

2000 IMECE BED Program Representative

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Report from the American Institute for Medical and Biological Engineering

The theme of this year's meeting of the American Institute for Medical and Biological Engineering (AIMBE) was "Health Care in the New Millennium: Merging Biology, Information Technology and Engineering". The meeting was held in Washington D.C. The first day (28th February 2001) consisted of a program on Federal Programs on Medical and Biological Engineering where representatives from all major federal agencies (Army, DARPA, Dept. of Education, Dept. of Energy, Federal Aviation Administration, NSF, NIST and NIH) described their research interests and support in this area.

The 2nd day, March 1st, the meeting was held at the National Academy of Sciences building. It was opened by Dr. Shu Chien of UCSD, President of AIMBE, who presented an overview of this year's activity. This was followed by a session on "the Impact of the Biological Revolution on Health Care".

The three speakers were: 1) Dr. Steve Warren of Emory University whose topic was "Genetics and Its Potential for Revolutionizing Health Care", 2) Dr. Shankar Subramaniam of SCSD, whose topic was "The Information Revolution in Biology and its Impact on Medicine in the New Millennium", and 3) Dr. James Bassingthwaite of the University of Washington whose topic was "The Physiome Project and Health Care". The topic of the second session was "New Technologies Shaping Medical Frontiers". The three speakers

were: 1) Dr. Richard J. Lipton of Georgia Tech, whose topic was "Biological Computing and its Medical Implications", 2) Dr. Michael L. Roukes of CalTech, whose topic was "Nanomechanical Systems and their Potential for Biomedicine", and 3) Dr. John Mayer of Boston Children's Hospital, whose topic was "The Promise of Tissue Engineering: Biological Heart Valves".

This was followed by the session entitled "The Empowered Patient in the Health Care System". The speakers were: 1) Dr. Bridget Duffy of Medtronic whose topic was "Forces Driving a Patient-Centered Healthcare System", 2) Dr. Erminia Guarneri of the Scripps Institute whose topic was "Determining the Role of Technology in Whole Person Medicine", and 3) Dr. David Eisenberg of the Beth Israel Deconness Medical Center whose topic was "Complimentary and Integrative Medicine: Current and Future Trends". The final session of second day was a panel discussion on "Introducing New Technologies; the Public Policy Challenges". The panelists were: Dr. Deborah Zarin of the Agency for Health Care Research and Quality, Dr. Daniel N. Mendelson of the Health Strategies Consultancy and Dr. Bernard Statland of the FDA. This was followed by the keynote address "Partnerships for the New Millennium" by Dr. Ruth Kirschstein, the acting director of NIH.

The next day of the program was held at the Washington Marriott Hotel, and it

started with an open forum on "Occupational Safety and Health". The panelists were: 1) Dr. Don P. Chaffin of the University of Michigan who spoke on "Biomechanics and Ergonomics", 2) Dr. Arthur T. Johnson of the University of Michigan who spoke on "Personal Protective Equipment", and 3) Dr. Sheldon Rabinovitz who spoke on "Toxicology". This was followed by a second open forum on "Bioengineering and Biomedical Imaging at the NIH". The panelists were: Dr. Donna J. Dean of NIH, Dr. Stanley Baum of the Academy for Radiology Research, and Dr. John H. Linehan, past president of AIMBE. They described the historic events that led to the recent establishment of the National Institute of Biomedical Imaging and Bioengineering at NIH.

This was followed by an afternoon open forum on "Biomedical Engineering Education-Where do we go from here?". The panelists were: Dr. Wendy Newstetter of Georgia Tech, Dr. Lawrence Schramm of the Johns Hopkins University, and Dr. Peter Davies of the University of Pennsylvania. There were two parallel open forums in the afternoon: 1) "Session for Young Biomedical Engineering Faculty: Navigating the Waters of Promotion and Tenure" and 2) "Hurdles of the Information Age on Public Health Practice and Health Care Delivery".

Sabrata Saha
ASME Representative to AIMBE

CALL FOR PAPERS

The Biomedical Engineering (BIO) Division asks Biomedical Engineers in academia and industry from across the world to consider submitting a paper that focuses on education for the annual 2002 ASEE Conference and Exposition in Montreal, Quebec on June 16-19. Six of the following ten topics listed below will be included in the Biomedical Engineering Division of the 2002 conference program, depending in part on the papers submitted.

- Biomedical Engineering Education Outside the U.S. including Study Abroad Programs.
- Assessment of Biomedical Engineering Educational Programs.
- Industry Participation in Biomedical Engineering Education.
- Curriculum Development in Biomedical Engineering.
- Biomedical Engineering Laboratories, Virtual versus Traditional Approaches.
- Problems Facing New Biomedical Engineering Programs.
- Careers for Biomedical Engineering Graduates (The value of internships and where do they go after graduation).
- Clinical Exposure in Biomedical Engineering Education.
- Innovative Educational Materials and Textbooks in Biomedical Engineering.
- Societal Issues and Ethics in Biomedical Engineering Education.

For those of you wishing to be authors, a 200-300 word abstract will be required by November 1, 2001 and, if accepted, the final paper will be due by January 15th. Abstracts will be judged based on the level of innovation, technical merit, demonstrated outcomes, and relevance to biomedical engineering, science and technology education.

All the abstracts and papers must be submitted via the WEB via the main ASEE site at <http://www.asee.org>

Please consider submitting a paper for the 2002 ASEE Annual Conference.

BIO Program Chair: Gerard L. Cot , Ph.D., P.E., Biomedical Engineering Program, Texas A&M University, 233 Zachry Bldg., College Station, TX 77843-3120, cote@tamu.edu.

ASME Ad-Hoc Biomechanical Standards Committee Meeting October 12, 2001 Washington, D.C.

A meeting of the ASME Ad-Hoc Biomechanical Standards Committee took place on Friday, October 12, 2001 at the ASME International offices in Washington, DC.

The ASME International offices are located at:

Washington Center
1828 L Street NW, Suite 906
(202) 785-3756

The committee's long-term objective, as stated in its charter, is to establish fundamental rules and criteria of mechanical design by analysis for the integrity and safety of medical devices.

Two of the main goals for the meeting will be the attempt to achieve committee member balance (academic, government, industry), and to draft a scope of the proposed standard(s) that the committee will develop.

Journal of Biomechanical Engineering

The *Journal of Biomechanical Engineering* continues to grow and develop as it serves the intellectual needs of the biomechanical engineering community. Since the ASME three years ago increased the number of issues annually for four to six, with a proportional increase in number of budgeted pages, the time in queue between acceptance of a manuscript and initiation of processing by the publisher for print has been reduced to near zero. Further, with the increased publication frequency, we are able to ensure that new research reaches the published archival literature with a smaller delay than was previously possible.

The key to ensuring the quality of the *JBME* is the Board of Associate Editors. In this vein I want to acknowledge the outstanding service of four Associate Editors who completed their second three year term on the Board in December, 2000; Vijay Goel of the University of Iowa, Rich Hart of Tulane University, John McGrath of Michigan State University and Vince Turitto of the University of Memphis. In January, 2001 five new Associate Editors were added to the Board, increasing the membership total to 21; Cheng Dong of Penn State University, David Fyhrie of Henry Ford Hospital, Michael Sachs of the University of Pittsburgh, Elaine Scott of Virginia Tech, and Christopher Vaughn of the University of Cape Town.

One significant change for authors submitting papers starting January, 2000 is that the number of printed pages permitted before the mandatory excess-page charge is invoked has been increased from six to nine pages. Since the average length of papers published in *JBME* is approximately eight pages, this new policy should make the journal an even more attractive option for prospective authors. Given the flexibility to having a significantly larger total page allocation from the publisher, more pages exempted from the excess-page charge, and the ability to publish manuscripts more quickly, we are now able to solicit special interest papers in particular areas. For example, we have begun to publish a written version of the Lissner award lecture, to invite review articles on selected topics, and to consider groups of papers from targeted symposia at technical meetings (including some not organized by the ASME). Your ideas and initiatives on special manuscript topics are always welcome for discussion.

We continue to work to improve the effectiveness of our operation of the editorial office, and I owe a debt of gratitude and sincere thank you to the excellent Editorial Assistant with whom I work,

Jenni Cork, for making essential contributions to this effort.

I am now completing my fifth and last year as *JBME* Editor. The BED Executive Committee is considering an excellent slate of prospective candidates, and by this time next year the leadership of the Journal will be in new hands. It has been a privilege to serve as the Editor of the *JBME* during a time of exceptional growth and change to both the Journal and the field of biomechanical engineering. I have enjoyed interacting with hundreds of authors who have submitted papers to the journal, and especially with an outstanding group of Associate Editors. I wish my successor an experience in this position as fulfilling as mine has been.

Ken Diller, PhD, Editor

2001 Bioengineering Conference in Snowbird, Utah, June 27–July 1, 2001

If you wanted to learn about the most recent developments in Biomechanics, the place to be was at our Summer Research Conference. About 550 registered guests attended about 470 presentations, about half of which were given in the traditional, oral podium format, the remainder were presented in the form of commented posters. The meeting attracted leaders in bioengineering from around the world, and also several outstanding individuals in other, closely related fields. The plenary presentations were a showcase for the power of biomechanics, beautifully illustrated in the opening session by the integrative modeling effort of the contracting heart by Dr. Peter Hunter and his research team in Auckland, New Zealand. The large complexity of biology became apparent in the plenary session presented by Dr. Michael Sheetz, Columbia University, who discussed the array of molecular modules in the cytoskeleton and in the membrane involved in a “simple” pseudopod projection. The role of physical analysis at the level of single DNA and RNA strands was illustrated by the pioneering work of Dr. Steve Chu, Nobel Laureate from Stanford University. He illustrated the use of hemodynamics, laser tweezer technology, fluorescence energy transfer with applications to DNA unfolding, ribozyme activity, and neuronal vesicle fusion. Dr. Peter Walker, the recipient of the 2001 Rice award by ASME, presented an account of some three decades of knee prosthesis development, indeed a rich history in Biomechanics design.

The broad range of plenary topics was reflected in the oral and poster sessions.

Here are some of the session titles:

- Molecular Biomechanics, Cell Mechanics, Cytoskeletal Force Transduction, Membrane Mechanics, Cell and Tissue Engineering, Cell and Parenchymal Mechanics, Mechanics of Cardiovascular Cell Activation, Cell Adhesion and Motility, Rheology of the Cytoskeleton,
- Cardiovascular Mechanics, Mass Transfer in Large Arteries, Cardiac Valve Mechanics, Cardiovascular Systems Simulations, Mechanics of Cardiovascular Interventions, Arterial Pathology Mechanics, Stented Artery Mechanics;
- Respiratory Mechanics, Respiratory Airflow, Pulmonary Flow and Transport, Biomedical Transport, Brain Biomechanics, Flow and Structure in the Eye, Airway Closure/Opening;
- Soft Tissue Mechanics, Soft Tissue Growth and Remodeling, Tissue Biomechanics, Fluid Flow in Bone, Bio-heat Transfer;
- Orthopedic Cellular Engineering, Joint Mechanics, Orthopedic Tissue Engineering, Bone Biomechanics, Spine Biomechanics, Cartilaginous Tissue Mechanics, Orthopedic Biomechanics, Tendon and Ligament Mechanics, Implant Biomechanics;
- Pediatric Mechanics, Computational Biomechanics and Imaging, Cell and Tissue Level Computational Biomechanics, and Vehicular Mechanics.

The poster sessions had a prominent role in the program. They were located in the Conference Center and were scheduled without time conflicts but with a lunch box. Each poster was introduced in a short summary, and the two Chairs for each cluster of posters selected the best poster in their respective categories. The highly competitive B.S., M.S. and Ph.D. Student competition was full of innovation and bright ideas. The best poster winners and the title of their presentations in each category were:

Tissue Biomechanics: Ariel Sverdluk and Yoram Lanir, Technion-Israel Institute of Technology, “Viscoelasticity and Preconditioning in Sheep Digital Tendons”.

Biomedical Transport: Takuzo Iwatsubo, Aneta Nicoleta Suciuc, Mitsumasa Matsuda, and Masahiro Kurosaka, Kobe University, Japan, “Development of a Poro-Elastic Squeeze Film Lubrication Mechanism for the Artificial Knee Joint”

Cardiovascular Mechanics: Paul N. Watton and N.A. Hill, University of Leeds, United Kingdom, “Abdominal Aortic Aneurysms: A New Mathematical Model”.

Cell and Molecular Mechanics: Toshiro Ohashi, Yasuaki Ishii, Yasushi Ishikawa, Takeo Matsumoto, and Masaaki Sato, Tohoku University, Sendai, Japan, "Analysis of Local Mechanical Properties of Sheared Endothelial Cells Measured by Atomic Force Microscopy".

Cell and Tissue Engineering (tie):

Brett R. Blackman and Michael A. Gimbrone, Jr., Harvard Medical School, Boston, "An In Vitro System to Simulate and Visualize In Vivo-Like Arterial Waveforms on Cultured Endothelial Cells".

Jessica E. Wagenseil, Ruth J. Okamoto, and Elliot L. Elson, Washington University, St. Louis, "Viscoelastic Properties of Bio-Artificial Tissues".

Computational Biomechanics and Imaging: Jeffrey J. Heys and Victor H. Barocas, University of Colorado at Boulder, "Modeling of Passive Iris Deformation During Accommodation".

Cardiovascular Mechanics: Monica Soncini, Alberto Redaelli, Emiliano Votta, and Alex Sormani, Politecnico di Milano, Italy, "3-D Computational Models for the Simulation of the Suture Stress After Mitral Valve Edge-to-Edge Repair".

Orthopaedic Biomechanics: Frank Heuer, Tamara Simpson, James Krieg, and Michael Bottlang, Legacy Clinical Research and Technology Center, Portland, Oregon, "Stabilization of Pelvic Ring Fractures by Circumferential Compression".

Ph.D. Level Competition: Orthopaedic Biomechanics: Stavros Thomopoulos, Gerald R. Williams, and Louis J. Soslowsky, University of Pennsylvania, Philadelphia, "Tendon to Bone Healing: Changes in Viscoelastic Properties Due to Post-Operative Activity Level".

Ph.D. Level Competition: Cardiovascular Mechanics: Christopher P. Cheng, David Parker, and Charles A. Taylor, Stanford University, "Wall Shear Stress Quantification from Magnetic Resonance Imaging Data Using Lagrangian Interpolation Functions".

Ph.D. Level Competition: Biological Transport: Marryn Howatson-Tawhai and Peter J. Hunter, University of Auckland, New Zealand, "Water and Heat Transfer in an Anatomically-Based Mathematical Model of the Human Lungs".

M.S. Level Competition: Dimitri Deserranno, Neil L. Greenberg, James D. Thomas, and Mario J. Garcia, The Cleveland Clinic Foundation, Cleveland, Ohio, "Quantification of Mitral Valve Regurgitation Based on Normalized Velocity Distribution".

B.S. Level Competition: Mark Sommers, Christoph Roth, Harry Hall, James Krieg, and Michael Bottlang, Legacy Clinical Research and Technology Center, Portland, Oregon, "Characterization of Lag Screw Migration Under Cyclic Loading in an Intertrochanteric Fracture Model".

Congratulations to these investigators.

Each morning started with a tutorial about biological techniques, organized by Dr. David Vorp, covering a wide range of topics from functional genomics measurements, tissue culture techniques, quantitative microscopy, to state of the art proteomics.

Thanks has to go out to many individuals who generously gave their time to prepare for the conference: Drs. Stephen Cowin, Ross Ethier, Farshid Guilak, Douglas Lauffenburger, James Moore, Kevin Meade, Alexander Popel, Elaine Scott, Melody Swartz, Jennifer Wayne, and George Zahalak who conducted the review of the abstracts and served on the program committee. The members of the steering committee: Mohamed Samir Hefzy (Publications), Lou Soslowsky and Dawn Elliot (Local Arrangements), Kevin Meade (Student Competition), Gerald Miller (Site Selection), David Butler (Finances), and Gerard Ateshian (Web Site) who generously donated many hours of their time.

The students from the Department of Bioengineering at the University of Utah, under the guidance of Professor Jeffrey Weiss solved all LCD projection problems with virtually 100% effectiveness. We extend a special thanks to them. The Conference Center ambience was breathtaking and the encounters with wildlife during the afternoon hikes into the mountains will remain memories for a long time.

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Calvin J. Rice Lecture Presented at Snowbird Meeting

This year's award winner of the Calvin J. Rice Award was Peter S Walker PhD who presented a lecture entitled "Prospects for Advances in Total Knee Replacement". This is one of the highest honors conferred by ASME, and is intended to recognize, in particular, significant contributions to the profession by individuals who have worked outside of the US for much of their career. Dr Walker has had a special interest in knee replacement since working at the Hospital for Special Surgery in New York in the 1970's. More recently, after spending 13 years at University College London in the UK, Dr Walker returned to New York in 2000 to be the Director of Biomedical Engineering at The Cooper Union for the Advancement of Science & Art. The lecture started by showing a wide range of situations where total knees are indicated, and then defined a set of realistic goals in the categories of function and durability. The major types of total knee designs which have emerged were then described. Due to the vast amount of research and clinical experience since about 1970, the results of total knees were shown to be outstanding, with survivorship well into the 90th percentile at 10-15 years follow-up, and close to normal function, especially for the older age groups. Part of this success was attributed to the sophisticated pre-clinical and clinical evaluation tools which had been developed.

However, new advances in design were on the horizon. While pointing to the future potential for biological treatments for arthritis of the knee, Dr Walker focused on those areas where new technology could provide the solutions. One of the limitations of present designs was that a normal range of flexion could seldom be achieved. This could be addressed using new designs and techniques. Perhaps the most promising area for new advances was computer-aided surgery. For example, using instrument navigation systems, accuracy and reproducibility could be enhanced. In addition the time of the procedures could be markedly reduced. An exciting application of this technology was minimally-invasive compartmental knee surgery, where bone cuts which were inaccessible using conventional instrumentation, could be made through small incisions. Robotic technology could even be used to insert components accurately, and could be applied to perform procedures which were a combination of biological and mechanical solutions. Dr Walker proposed that the biomechanical engineer had a vitally important role to play in the future of knee replacement, and indeed to joint replacements in general.

2000 ASME H.R. Lissner Medal



Morton H. Friedman

The H.R. Lissner Medal was established in 1977 and is presented for outstanding accomplishments in the area of bioengineering. The 2000 Lissner Medal was presented to Morton H. Friedman, Ph.D.,

Professor of Biomedical Engineering and Chemical Engineering at the Ohio State University, Ohio for his outstanding contribution in the area of hemodynamics and atherosclerosis. His publications and presentations have added immensely to knowledge in this area.

Dr. Friedman has been active in bioengineering research since 1970. His early work was related to fluid dynamics and mass transfer in the cornea, and he lists over 20 publications in this area. He began his studies in 1972, and it is in this area that he has had a significant and sustained impact. His initial work was to examine the fluid dynamics in geometries simulating blood vessels, and it encompassed both experimental and computational approaches. He is noted for his work in

making casts of arteries from specific individuals and then studying the fluid dynamic behavior in these models. He coupled his fluid dynamic studies with results from pathological examination of tissues in order to correlate engineering and biological data, seeking relationships between wall shear and intimal thickness in arteries. He proposed that the geometry of an arterial bifurcation posed a "risk factor" for atherosclerosis by analogy with other clinical risk factors such as high blood pressure, smoking, etc. He has studied the aortic bifurcation and the major coronary arteries in great detail, publishing numerous papers and articles in proceedings. He examined the effects of wall compliance on the flow field, and he has utilized magnetic resonance imaging to image human subjects and deduce geometry and fluid dynamics behavior *in vivo*.

Dr. Friedman's dedication to the BED of ASME has also been exemplary. He served as chairman of the fluid mechanics committee, associate editor of JBME, a member of the executive committee and then chairman of the Division. He was general chair of the first Summer Bioengineering Conference in 1993 and continues to participate actively in technical pro-

gram and more general planning for the division. His commitment to serve the bioengineering community at large has also been distinguished. He was president of the Biomedical Engineering Society, a founding member of AIMBE, and is currently chairman of the U.S. National Committee on Biomechanics. He received the ASME Dedicated Service Award in 1998.

Dr. Morton H. Friedman was employed as a Senior Chemical Engineer at the 3M Company in St. Paul, Minnesota from 1960 to 1965. He became a Senior Engineer at the Johns Hopkins University Applied Physics Laboratory in 1965 and later took on positions as Group Supervisor, Deputy Director of Biomedical Engineering Programs and Chief Scientist of Biomedical Engineering Programs at APL. He became Professor of Biomedical Engineering and Chemical Engineering and Pathology and Associate Director of the Biomedical Engineering Center at the Ohio State University in 1988 and served as Director of the Biomedical Engineering Center until 2001. He is now chair of the Department of Biomedical Engineering at Duke University.

You can obtain a nomination package by visiting <http://www.asme.org/honors/ms71/saa/lissner.html>.

2001 ASME Y.C. Fung Young Investigator Award



David Meaney

ASME's Committee on Honors and the Bioengineering Division are delighted to announce that David Meaney, Ph.D. is the recipient of the 2001 ASME Y.C. Fung Young Investigator Award.

The ASME Y.C. Fung Young Investigator Award was established by the Bioengineering Division of the American Society of Mechanical Engineers in 1985 as a division award and elevated to an ASME societal award in 1999. The purpose of the award is to encourage young investigators to pursue research in bioengineering by acknowledging recipients early in their career for the quality of their research and their commitment to bioengineering. The award is named in honor of Yuan Cheng Bertram Fung, Ph.D., Professor of Bioengineering at the University of California, San Diego. Professor Fung is considered by many to be the father of modern bioengineering. Professor Fung is a long-standing member of ASME, and a past recipient of the ASME H.R. Lissner Award for his out-

standing achievements in the field of Bioengineering. To date, the Bioengineering Division has awarded twelve Y.C. Fung Young Investigator Awards.

Dr. Meaney is an Associate Professor in the Department of Bioengineering at the University of Pennsylvania. Dr. Meaney received his BS degree (1987) from Rensselaer Polytechnic Institute in Biomedical Engineering and both his MS (1988) and PhD degrees (1992) in Bioengineering from the University of Pennsylvania. His research focuses on the biomechanics of injury to the central nervous system. More specifically, he develops models to study the whole tissue deformations that are responsible for brain injuries, he performs experiments to characterize the relationships between whole tissue deformations and those of cellular/subcellular microstructures, and he studies mechanotransduction. To support his research, Dr. Meaney has received grants from the Whitaker Foundation, the National Institutes of Health, the National Science Foundation, and the Centers for Disease Control. To describe the results of his research findings, Dr. Meaney has co-authored more than 30 full-length articles in scientific journals and 5 book chapters. In recogni-

tion of his research contributions, Dr. Meaney has received several honors and awards including a Career Award from the National Science Foundation (1998) and the John Paul Stapp Best Paper Award (2000). Finally, Dr. Meaney has provided important services to the Bioengineering Division of ASME in regularly organizing sessions for the Heat and Mass Transfer in Biotechnology Technical Committee (K-17) at both the International Mechanical Engineering Congress and Exposition (IMECE) and Summer Bioengineering Meeting.

The Y.C. Fung Young Investigator Awards will be given to a young investigator who is under 36, and has received a Ph.D. or equivalent bioengineering degree. The individual must be committed to pursuing research in and have demonstrated significant potential to make substantial contributions to the field of bioengineering. Such accomplishments may take the form of, but are not limited to, design or development of new methods, equipment or instrumentation in bioengineering; and research publications in peer-reviewed journals. The deadline for nominations is February 1, 2002. You can obtain a nomination package by visiting <http://www.asme.org/honors/ms71/saa/fung.html>