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Bioengineering Division Newsletter

Christopher R. Jacobs, Ph.D, Editor

Fall 1999

Chair's Message



Kenneth R. Diller

1 998-99 marks the first full year for implementation of the new strategic plan for the Bioengineering Division (BED). The strategic plan has provided a very effective framework

for identifying and pursuing a broad spectrum of initiatives to benefit the BED and its membership.

The BED strategic plan has been developed with the vision that "the ASME Bioengineering Division will provide international leadership in Biomechanical Engineering for the interchange of technology, direction of educational programs, and promotion of professional development in academia and industry." The full text of the strategic plan may be accessed at the BED website: http://www.asme.org/divisions/bed/st_rpln.html. The plan consists of three primary thrusts for the Bioengineering Division:

1. to be the forum of choice in Biomechanical Engineering for intellectual activities and interchange of technology in research, development and manufacturing.

2. to be the society of choice for professional activities in Biomechanical Engineering.

3. to be the organization of choice for educational activities in Biomechanical Engineering.

The plan was formulated by the BED Executive Committee with extensive input from the Division membership starting in 1997. More than 50 initiatives are identified in the plan for implementation, and several are already accomplished. The plan is far too detailed to present or even try to discuss in this column, but I invite all of you to inspect it and to send your comments and ideas directly to members of the Executive Committee. We consider the strategic plan as a working document; there have already been some updates and modifications to it during this year. Your input is important to keep our vision current and to help guide us in directions that we have not yet identified clearly. Please feel free to provide your input and feedback.

I would like to summarize briefly some of the BED activities from the past year. The 1998 IMECE and 1999 Summer Bioengineering Conference were focal points of activity. At the IMECE, 37 podium sessions and one poster session were conducted, plus additional sessions were cosponsored with other Divisions. The total number of papers presented at podium was 223, plus 30 as posters and 17 student presentations. These numbers are consistent with the level of participation over the past five years and are limited in large part by the IMECE meeting facili-

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Editor's Message

Iwould like to take this opportunity to introduce myself as your Newsletter Editor for the next three years. In reviewing past Newsletters I was struck by the outstanding effort put in by the outgoing editor, Farsh Guilak. I'm sure that all BED members will join me in expressing our gratitude for his past and continued service. I would like to thank the contributors to this issue, particularly the committee chairs and ASME staff. I would also like to draw your attention to a few highlights of this issue including the Fung Award, now a society level award, the Thurston Award, the Lissner Award, and a report by Rita Patterson on her experiences as the Minority Leadership Program Intern to the Board on Research and Technology Development. Finally I would emphasize that keeping the Newsletter interesting and valuable to its readers is something all BED members can be involved with. If you have a suggestion or contribution please send it to Christopher R. Jacobs, Penn State College of Medicine, Department of Orthopaedics and Rehabilitation, Musculoskeletal Research Laboratory, PO Box 850 MS H089, Hershey, PA 17033 or email to cjacobs@psu.edu. I look forward to hearing from you in the upcoming year.

Christopher R. Jacobs
Editor

**See Survey on Page 10
or see [www.asme.org/
divisions/bed](http://www.asme.org/divisions/bed)**

Chair's Message

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ties. Attendance in BED-organized sessions has continued to grow substantially over the past few years. Another primary activity at the IMECE was the presentation of awards. The endowment for the H.R. Lissner Award was increased to include a medal with the award; the Y.C. Fung endowment was increased to the level of a Society award; the best paper award was named in honor of R. Skalak; permanent funding was established for the student paper competition; and the endowment for the Thurston Lecture is being increased in coordination with the other Basic Engineering Group Divisions to become a Society level award. The resources to enable these award upgrades were developed in large part from the successful Summer Bioengineering Conferences that the Bioengineering Division has organized and run.

The 1999 Summer Bioengineering Conference was held in June in Big Sky, Montana. The meeting schedule included 54 sessions, with a 7-session symposium honoring Y.C. Fung on his 80th birthday, a student poster competition, and panel discussions. More than 350 papers were presented, and attendance was in excess of 500. A strong consensus among the participants was that the meeting was a great success and provided high levels of personal and professional satisfaction. Plans are in motion for organizing the next meeting in 2001.

1998 was the initial year that the ASME Journal of Biomechanical Engineering was published in six issues, a first for the ASME. In addition to a 50% increase in the number of issues annually, the page allocation was also increased by 50% to approximately 800. As a result, the backlog of accepted papers has been reduced dramatically, and the time to publication has also been shortened. A special issue on "Microsystems Technology in Medicine and Biology" was published, and other special issues focused on frontier technologies are planned. A more complete report on the JBME is presented elsewhere in the newsletter.

The Bioprocess Engineering Technical Committee organized another of its successful series of annual symposia. It was held in Boston in November 1998, attracting more than 250 participants, most of whom have industrial affiliations, and earning a profit for the Committee and Division.

The BED has participated in the Task Force in bioengineering concerning legislation for the establishment of a Bioengineering Center at the National Institutes of Health. An ASME position statement on "Bioengineering Research at the National Institutes of Health" was developed and presented.

The ASME arranged, with co-sponsorship by other societies including AIMBE,

AIChE, IEEE and ASEE, a congressional briefing in the Rayburn House Office Building on October 2, 1998. The topic was "Engineered for Life: New Frontiers in Bioengineering." The briefing was led by Dr. Winifred Phillips, President of ASME International.

Important new BED activities included the formation of a Bioengineering Education Committee, under the leadership of Gerry Miller, and initial planning for a Bioengineering Standards Exploratory Committee, organized by Peter Torzilli. The Bioengineering Education Committee is organizing sessions for the 1999 IMECE. Both of these committees have the potential for substantial impact on both the BED and the bioengineering community at large. Both will also require considerable time, effort and talent to realize their potentials, and it is anticipated that many BED members will be key contributors.

There are many new and exciting activities within the Bioengineering Division, including new committees and meetings, plus there have been major changes in the Journal of Biomechanical Engineering. The Bioengineering Division has grown to become one of the most vibrant and innovative Divisions in the ASME, and I believe that we all see a bright future ahead.

*Kenneth R. Diller
BED Chair*

Bioengineering at the 1998 IMECE

The ASME held its annual winter meeting in November in Anaheim California. A welcome change for those of us in more northern climates. The BED program at the IMECE continues to be strong with a total of 223 technical presentations organized into 38 sessions. Abstracts of the presentations were published in the proceedings book edited by A.P. Yoganathan ("1998 Advances in Bioengineering", BED-Vol.39). There was one poster session and the remaining podium session distributed between Biofluids, Biosolids, Heat Transfer, Biomaterials, Design/Rehab, the Lissner Award talk, and the student competition. Seventeen student papers were entered in the competition, with 6 at the Ph.D., 6 at the M.S., and 5 at the B.S. levels. Also of interest was the Thurston Lecture delivered by Van C. Mow, the abstract of which is reproduced elsewhere in this issue. We all owe a vote of thanks to the program committee members and officers particularly Sohi Rastegar (Chair) and Ajit Yoganathan (Program Rep). In addition to the technical sessions there were a number of exciting activities organized by ASME including a behind-the-scenes look

at the Disneyland monorail. I'll see you all in Nashville!

*Christopher Jacobs
Editor*

A year spent as a Minority Leadership Program Intern

In 1998, I served as a Minority Leadership Intern. That year was a real eye opener for me with respect to the ASME. I had seen an article in the ASME newsletter asking for applications to the minority leadership program. Since I had been an associate member for 9 years in the Bioengineering division, I thought it was time to get more involved. So, I thought I would apply to the leadership program to get a better idea of what ASME was all about.

The objective of the minority leadership program is to increase the participation of underrepresented minority members through mentoring and leadership development. The program helps to familiarize minority members to the workings of ASME and to facilitate their active participation in the Society. As an intern, you participate in one of five one-year internships at the Operating Board/Committee level of ASME. Each participant works with a leading member (mentor) of a Board/Committee as a non-voting member, to gain experience and understanding of ASME activities.

The program allows you to select your areas of interest and they try to place you into one of those areas. My interest was in research so they placed me on the Board on Research and Technology Development (BRTD) with Jack Lloyd as my mentor. Jack was the BRTD V.P. for research in addition to being a distinguished professor at Michigan State University. This board oversees the ASME's Center for Research and Technology Development (CRTD).

I began my internship at the 1998 winter annual meeting in Dallas. There I attended the BTRD meeting as well as meetings of two BRTD standing committees, the Board Committee on Technology Development and the Codes and Standards Research Planning Committee. I also attended a meeting of the Council on Engineering and began to understand where the Bioengineering division was in ASME's hierarchy. In addition, the program paid for all of the interns to attend the 1998 Technology Executives Conference in Houston, a very intense two day meeting jam-packed with information about ASME.

The CRTD provides a mechanism for engineers and managers from industry and government to identify and meet technical needs. Through the Center, task

groups form a plan, raise funds for and manage cooperative, interdisciplinary activities in research and/or technology development. Once the Center identifies an appropriate problem, it establishes a task force to study and seek solutions to the problem. The task force is composed of individuals and organizational representatives with common interests in the technical issue. They then develop a strategy and identify potential methods to address the problem. The Center facilitates this process by working to procure funding for the project and acts to obtain services of qualified institutions, corporations and consultants who will assist the ASME volunteers in conducting the actual work.

I found the members of the BRTD to be very gracious and actually interested in my opinions. From the beginning, I felt encouraged to think of projects that would involve the Bioengineering division. In addition, my mentor, Jack Lloyd, not only helped me understand how ASME works but has continued to advise me in many areas of my career and for

that I am very grateful. In fact, in the summer of 1998, Dr. Lloyd nominated me to become a full member of the board and I was voted in as a member-at-large for the 1999 - 2001 term.

The last year has been difficult for the Center because several projects are ending, and without new projects the Center will not be able to meet the objective of operating without a subsidy by the year 2002. I feel that the Center provides a much-needed service to ASME and its divisions and hope that it will be able to find a way to continue its activities. One new budding area for the Center is Risk-Based Technology. This technology could be applied to Bioengineering not only in inspections or testing but also in the context of decision trees for medical diagnosis.

If you have a technical problem or an idea for technology development or demonstration you can approach the Center with your idea. Most projects are suggested by either potential sponsors, potential contractors, or ASME members or technical divisions. I would like to

thank the Council on Public Affairs and the Board on Minorities and Women for sponsoring this program. I would also like to thank Jack Lloyd and the Center for Research and Development for their support during my internship year.

And remember...

"Reach high, for stars lie hidden in your soul.

Dream deep, for every dream precedes the goal" - *Pamela Vaull Starr*

Minority Leadership Program Intern 1998-99
Rita Patterson

Editor's Note: For more information on the Minority Leadership Program Internship contact Sonya Engle (202) 785-3756, engles@asme.org. Also, if you are interested in becoming an intern, but are not eligible for the Minority Leadership Program you should consider the Leadership Development Initiative Internship Program. For more information on the LDI program contact Warren Leonard (212) 591-7846 (leonardw@asme.org).

1999 International Mechanical Engineering Congress & Exposition (IMECE) in Nashville, Tennessee



The program for the Bioengineering Division is a 'must see' during the upcoming 1999 IMECE at the Opryland Hotel and Convention Center. BED sessions will start on Sunday, November 14 and continue through Wednesday November 17, with 39 podium sessions totaling over 180 presentations. The theme of the IMECE this year will be 'Engineering Innovations for Increased Productivity'. BED will have several 'highlight' industry sessions emphasizing this theme in which industry representatives interface with academia. Three student paper competition sessions are also scheduled for Monday. Numerous additional sessions will showcase current technologies and new research discoveries in Bioengineering.

The H.R Lissner Award Ceremony will be held Tuesday, November 16 starting at 11:15 am. Following presentation of the lecture, a reception will be held. The Lissner Awardee for 1999 is Stephen C. Cowin, Ph.D. of the City College of New York.

The BED general meeting is planned for Tuesday evening, prior to the Division dinner. This is the first year that the Y.C. Fung Young Investigator Award, a Division award since 1985, is recognized as an ASME society award. The recipient of this award for 1999, Rebecca Richards-Kortum, Ph.D. from the University of Texas at Austin, will be honored at the Division dinner. New Division Fellows, the Student Paper Competition winners, and the Best Paper Award winners will also be honored at the dinner.

If you have any questions regarding the conference, please visit the website, <http://www.asme.org/divisions/bed/imece99.html> or contact Jennifer Wayne, 1999 BED Technical Program Representative, at 804.827.0487, email BED99@hsc.vcu.edu

Report from the American Institute for Medical and Biological Engineering

This year's annual meeting of the AIMBE was held in Washington, D.C. from March 12-14, 1999. Prior to the main meeting on March 11th, AIMBE and the National Science Foundation held a session on Federal Programs in Bioengineering which included presentations from program managers from NIH, NSF, Department of Education, Department of Agriculture, National Institute of Standards and Technology, Department of Energy, U.S. Army, and the Office of Naval Research.

On Friday, March 12th, the main symposium "Therapeutic Delivery: Opportunities and Challenges for Bioengineering" was held at the National Academy of Sciences Building in Washington, D.C. This symposium was organized into three sessions: 1) Local and Regional Delivery, 2) Systemic Delivery and 3) Transition from Research to Application. The topics addressed in Session I were Advanced Drug Delivery Systems by Dr. R. S. Langer from MIT, Drug Delivery to the Brain and Spinal Cord by Dr. E. H. Oldfield from NIH, and Drug Delivery to the Peritoneal Cavity by Dr. M. F. Flessner from University of Rochester. The second session of this symposium consisted of speeches on In-Vivo Transport, Microcirculation, and Bioengineering Analysis by G. W. Schmid/Schonbein from UCSD; Delivery of Molecular Medicine to Solid Tumors by Dr. R. K. Jain from Harvard Medical School and Massachusetts General Hospital and Cancer Treatment by Targeted Drug Delivery to Tumor Vasculature by Dr. E. Ruoslahti from The Burnham Institute. Finally, session three consisted of speeches from Dr. R. Duncan from the College of Pharmacy, University of London on Polymer Drug Conjugates: From Lab to Clinic, Dr. N. Ferrara from Genentech on VEGF: From Basic Research to Clinical Trial, and Dr. J. Folkman from the Boston Children's Hospital on Angiogenesis: From Bench to Bed Side.

In addition to these three sessions, Dr. Ellie Ehrenfeld from NIH presented a Plenary Address on Scientific Peer Review Initiatives for Bioengineering in which she described how the traditional hypothesis based peer review system of NIH is being modified for appropriate review of bioengineering research. In the afternoon of March 12, 1999, an induction ceremony for 77 new fellows was held. As a part of the ceremony, the plenary

address was given by Dr. Rita R. Colwell, Director, NSF who spoke regarding the NSF Policy and Budgetary Priorities: Delivering Therapeutic Solutions. Dr. Colwell emphasized the important role that bioengineering can play in future research priorities.

In the morning of March 13, 1999, the Council of Societies met at the Washington Marriot Hotel. There were 25 attendees who represented 12 different societies including ASME. Reports were given on the November 1998 summit that was held in Minneapolis, AIMBE fundraising, funding from the Whitaker Foundation, and AIMBE's role in IUPESM. Dr. Bill Hendee, the immediate past president of AIMBE spoke about the World Congress on Medical Physics and Biomedical Engineering, which will be held in Chicago, July 23-28, 2000. At the end of the meeting, Dr. Susan Blanchard of NC State was elected the incoming chair of the Council of Societies.

Two additional symposiums entitled Government in Relation to Medical and Biological Engineering: An Update and Bioengineering Education and the Use of Instruction Technologies were also held on the Saturday of March 13. Dr. Dane A. Miller, president of Biomet, Inc. organized a session on Junk Science in the Court in which the speakers emphasized the need for proper expert witnesses in legal cases related to complex scientific issues.

AIMBE's Ninth Annual Event will be held Friday, March 3 and Saturday, March 4, 2000 in Washington, D.C.

Subrata Saha
AIMBE Rep

Journal of Biomechanical Engineering

We have now completed the initial year in which the *Journal of Biomechanical Engineering* became the first of ASME's technical journals to be published six times annually. This new format enables us to bring new research to the readers in a more timely manner, which is important in a field such as biomedical engineering with a rapid pace of intellectual discovery and application. An added benefit of the new format is that ASME agreed to maintain the size of the individual issues, with a result that there is now 50% more pages available for publication of manuscripts than before. A primary consequence of this arrangement is that the waiting time for publication of accepted manuscripts has been reduced dramatically. The added page capacity also provides flexibility critical to serving the needs of the biomechanical engineering community.

For example, this year we published a special issue, organized by Associate Editor Mehmet Toner, on the new area of Microsystems Technology in Medicine and Biology. It is important to be able to bring informative and exciting results from rapidly developing new aspects of the discipline to the attention of the biomechanical engineers. A number of additional special issues are planned for the near future.

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 terms on the Board in December, 1998. These are Art Erdman of the University of Minnesota, David Ku of the Georgia Institute of Technology, Bob Roemer of the University of Utah, and Salvatore Suter of Washington University. In January, 1999 six new Associate Editors were added to the Board, bringing the total to 20. The new members are Ross Ethier of the University of Toronto, Jay Humphrey of Texas A&M University, Jimmy Moore of Florida International University, Marcus Pandey of the University of Texas at Austin, Tom Skalak of the University of Virginia and Charles Turner of Indiana University/Purdue University Indianapolis.

As the field of biomechanical engineering continues to grow at a rapid pace, the position and prominence of the JBME in the research community has also become increasingly strong. Performance of the journal can be assessed via many metrics. For example, the number of manuscripts submitted for publication has increased for each of the past five years, and the trend continues in 1999. The citation impact factor for articles published in JBME is the highest among all journals published by ASME. The average total time from submission of a manuscript to publication has been reduced dramatically, owing to the increase in number of pages and frequency of publication of the journal. We have implemented steps to attempt to further reduce the processing time by accomplishing manuscript reviews more promptly. Special issues are being published to present state-of-the-art developments in emerging areas of biomechanical engineering research. We have also worked to improve the effectiveness of our operation of the editorial office, and I owe 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.

As always, I am eager to hear of any suggestions that you have for ways to improve the journal. Please do not hesitate to share your ideas.

Kenneth R. Diller
Technical Editor, *Journal of Biomechanical Engineering*

News From the Technical Committees

Solid Mechanics Committee

The Solid Mechanics Committee continues to be the largest Technical Committee both in terms of membership, number of sessions and number of papers organized at our national meetings. At the 1998 IMECE meeting in Anaheim, the Solid Mechanics Committee sponsored 14 podium sessions, 1 podium session jointly organized with the Biomaterials Committee, 1 session jointly organized with the Design and Rehabilitation Committee, and no poster sessions. These sessions covered a wide range of topics, including Bone Mechanics, Impact Mechanics, Spine Mechanics, and Joint Mechanics and Replacement. A symposium on Models for Soft Tissues (including fiber-reinforced, viscoelastic, and porous media) was also sponsored. For the 1999 meeting in Nashville, the Solids Committee has organized twelve sessions, including joint sessions with other groups.

For the Summer Bioengineering Conference, held in Big Sky Montana, in June 1999, the Solid Mechanics Committee had a truly tremendous impact. In short, more than half of the total program emanated from the Solids Mechanics Committee. This significant contribution represented 34 sessions, which were divided up across the meeting. While we were certainly excited about the number of sessions and papers we were able to organize, this large number of sessions required scheduling multiple solid mechanics sessions in parallel rooms. The work required to put on the summer program was significant and I personally would like to thank all the members and session organizers for their important contributions.

I would like to formally thank all the members of the Solids Committee, in particular the session organizers who put in so much hard work on behalf of the Bioengineering Division. Your effort is greatly acknowledged. Importantly, sincere thanks go to Dr. M. Samir Hefzy from the University of Toledo who has served as Secretary of this committee for the past few years. Samir has "moved up" to become a member of the BED Executive Committee and we wish him all the best. In his place, Dr. Farshid Guilak from Duke University will take over as secretary for this committee following a vote of committee members.

For further information on the Solid Mechanics Committee, please contact Lou

Soslowky (215-898-8653), email soslowk@mail.med.upenn.edu.

*Louis J. Soslowky
Solid Mechanics Committee Chair*

Fluid Mechanics Committee

The report on recent activities from the BED Fluid Mechanics Committee is best characterized by the old adage: "the only thing that remains constant is change". With rapid advances in computer technology, many of the challenging research problems of the past can now be solved on a desktop (or even laptop) PC. Many of us have thus turned our attention to challenging problems in fluid-structure interactions (at the organ, cellular and even molecular level), surgical devices, biomaterials and MEMS technology. Such sweeping changes in the research landscape have led to concomitant changes in the way we communicate our research to one another. Luckily, the membership of the fluids committee remains enthusiastic and optimistic about ASME activities.

At this year's summer bioengineering conference, there are approximately 100 papers being presented in sessions organized by the fluids committee. This is more than double the number at any previous summer meeting. Thus, after only three previous meetings, the summer meeting has established itself as one of the premiere conferences in our field. The organization of these sessions took place during the transition of chairs of our committee. I must therefore express my sincerest thanks to Stan Rittgers for his leadership, not only during this transitional period, but for all he did during the past three years as chair. I hope that I will be able to maintain his level of excellence.

While our numbers are up for the summer meeting, the news is frankly not as good for the IMECE (formerly WAM). The number of contributions for this meeting continues to dwindle, due in part to competition from other societies' meetings. Our recent committee survey reflects some of the sentiment that has led to the partial exodus, and will be invaluable as we shape the future of our participation at IMECE. As I am constantly reminded, ASME is an organization that strives to serve the best interests of its members. The fluids committee will continue to echo this philosophy in its efforts to make the conferences more appropriate for our members. We aim to

do this through fostering collaborative, topic-based sessions and further enhancing links with industry. I welcome any input you might have in these efforts.

Lastly, I must express my appreciation and congratulations to Ross Ethier, who was recently elected as Vice-Chair of the committee. I look forward to working with Ross during my term as chair.

*James Moore
Fluid Mechanics Committee Chair*

Design and Rehabilitation Committee

Since the IMECE 1998, the Design and Rehabilitation Committee resolved some old issues, developed a plan for the 1999 meeting and initiated new procedures for the committee's future work.

New officers were elected and will begin their duties in November, 1999. Thomas P. Andriacchi, Stanford University, is the new chairman with a three-year term. Rita Patterson, University of Texas Medical Branch in Galveston, is new assistant chairman. Dr. Patterson graciously agreed to fill the vacant position of Secretary until November and then assume a three year term as Assistant Chairman.

The committee organized several sessions for the IMECE in November. Dave Thompson, University of New Mexico, organized a highlight session, "Trends in the Design and Manufacture of Footwear", combining business perspectives with research. Several organizers arranged collaboration with other groups. Samir Hefzy was particularly active in creatively developing ideas into interesting presentations. Dr. Hefzy fulfilled one of the Design and Rehabilitation Committee's long-term goals by establishing a single forum for the presentation of design issues relating to disability research. Together with Alan Eberhardt of the Solids Committee, Dr. Hefzy organized a panel discussion entitled "Design Projects to Aid the Disabled". Then, working with Saheed Shirazi-Adl of the Solids Committee of BED, Dr. Hefzy put together a session entitled "Analysis, Modeling, and Control" which covers aspects of joint mechanics. Mike Murphy, Louisiana State University, helped broaden the discussion of microelectromechanical systems by organizing a panel discussion entitled "Microsystems for Surgery

and Rehabilitation". Lastly, Yildirim Hürmüzlü of Southern Methodist and Mark Miller, the former committee chairman, worked with the Dynamic Systems and Control Division to build a two session program. DSC and BED will each have a session entitled "Dynamics, Control and Design of Biomechanical Systems" in which some topics with inter-divisional interests can be presented.

As an item of continuing committee business, the draft of the Standard Operating Procedure was developed and should be finalized at the Nashville conference. The membership unanimously agrees that the committee needs to assist the summer program organizer, but no formal procedure has been instituted. Ensuring that the committee bears some responsibility for the summer meeting and developing new session plans for IMECE 2000 will be the most important topics in November.

*Mark C. Miller
Design and Rehabilitation
Committee Chair*

Finance Committee

The financial state of the Bioengineering Division (BED) continues to improve. The custodial accounts of the Division are stable and the recent success of the Summer Bioengineering Conference will further strengthen our financial condition. Whitaker Foundation has also kindly provided additional support for our Student Paper Competition. These positive developments should permit the Division to explore new initiatives for growing and sustaining its membership.

The BED maintains custodial accounts for the Bioengineering Division, the Bioprocess Engineering Subdivision and its Honors activities. The first two accounts permit the Division to support the IMECE Meeting, the Newsletter, alliance with the American Institute of Medical and Biological Engineering, as well as recurring office and miscellaneous expenses. The BED Honors Account supports our YC Fung Young Investigator Award and our Student Paper Competition. All three accounts are healthy and should continue to support the Division's current needs.

The Division is again expected to benefit from our just-completed Summer Bioengineering Conference in Big Sky, Montana. The meeting has definitely been a scientific and financial success for the Division. Boscov Travel was enormously helpful in coordinating travel and registration for the meeting and Debbie and Linda of Boscov are to be especially thanked for solving various on-site problems. We anticipated about 400 attendees at the meeting, and were pleasantly sur-

prised when over 510 people actually participated. For the first time, we also invited companies to exhibit products at the conference. Three companies (Instron, AMTI, and Biosynthetic) participated. We expect to invite a larger number of exhibitors to the next summer conference.

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 just recently learned that our proposal to extend their commitment has been approved by Whitaker and that three more years of support can be expected. We thank the Whitaker Foundation for sponsoring this valuable activity of the Division.

The Bioengineering Division will continue to identify and attempt to support new initiatives. The Executive Committee will be discussing these new initiatives at the upcoming IMECE meeting. We welcome suggestions for further strengthening our programs and for growing and sustaining our BED membership.

*David L. Butler
Finance Committee Chair*

Biomaterials Committee

This year has seen healthy activity in the Biomaterials Committee. At the 98 IMECE in Anaheim, it was decided that the Biomaterials committee should emphasize joint sessions with the Solids and Fluids Divisions as a means to strengthen interactions. Along these lines, at the summer Bioengineering conference in Big Sky a session was jointly organized with Fluids on Cell/Biomaterials interactions. For the upcoming 99 IMECE meeting in Nashville, two sessions will be joint with Solids on Cell Mechanics/micromechanics and Joint replacement/interface phenomena. There will also be a third session, offered solely by Biomaterials, on Chemical, Thermal, and Mechanical Modifications to Collagenous Biomaterials. We are currently exploring holding joint technical workshops with the Society for Biomaterials that highlight the biomechanical aspects of biomaterials. Again, thanks go to the committee members who have made this committee a success. We are always looking for more people who have an interest in biomaterials. Please contact Michael S. Sacks (msacks@pitt.edu) if you are interested in becoming involved with the Biomaterials Committee.

*Michael S. Sacks
Biomaterials Committee Chair*

Education Committee

The newly formed Education Committee was created by the New Directions Committee and the Executive Committee in 1998. Its mission is to serve as a vehicle for discussions of currently used educational techniques and programs involving bioengineering and biomechanics, as well as to foster the development of new methods in the educational arena. Several topics to be addressed in the coming years include ABET accreditation of biomedical engineering programs, new courses in cutting edge areas such as tissue engineering, new or proposed textbooks in bioengineering, and faculty development. The Education Committee will begin programming for the 2000 ICEME and the 2001 Summer Bioengineering meeting. Those BED members interested in this committee and participating in the development of educationally related sessions should contact Dr. Miller at gemiller@hsc.vcu.edu or at (804) 828-7263.

*Gerald Miller
Education Committee Chair*

Membership Development Committee

In 1998, the Membership Development Committee assumed the responsibility of the web site for the Bioengineering Division. As part of this charge, the committee worked with the Summer Bioengineering Conference Committee to implement abstract submission and review via the Internet for the 1999 conference. The conference announcement and Call for Papers were posted on the web and on several e-mail lists and list servers, saving time and money for the Division by avoiding the costs of printing and mailing. Authors were able to submit their abstracts by filling a web-based form and e-mailing their file over the Internet, with only the copyright assignment form required to be downloaded, printed and sent by regular mail. Similarly, reviewers were able to download their assigned abstracts via a password-protected web site, considerably increasing the efficiency of the review process. The success of this first attempt at a (nearly) paperless process paved the way for a similar approach adopted for the 1999 IMECE conference.

The Membership Development Committee encourages participation by all Division members in the various activities and responsibilities of the Division's committees. The organization and scientific topics of the various conferences

sponsored by the BED are decided by its members, in a process which typically starts two years prior to the conference. The strategic initiatives and future directions of the Division are similarly decided at the grass-root level, and therefore membership participation in these efforts is essential. All that is required to participate in these activities is to show up at the meeting of the committee which interests you, at the next conference; generally, all committees meet during the IMECE. A list of standing committees of the BED is provided in the by-laws of the division (www.asme.org/divisions/bed/ASME_bylaws.html) along with a description of their mission. The time and location of these meetings are generally announced in the preliminary program for the conference. If you require additional information about participation in the various committees of the Bioengineering Division, send e-mail to ateshian@columbia.edu.

*Gerard A. Ateshian
Membership Development Committee Chair*

United States National Committee on Biomechanics 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. During this past year, the USNCB conducted a retreat in Chicago, in order to further define the activities and priorities for USNCB action. As a result, the following four goals were developed: Development of teaching tools (Chair: Robert Spilker), Enhance the stature of biomechanics with respect to all scientific disciplines (Chair: Geert Schmidt-Schoenbein), Develop enhanced interac-

tions with industry (Chair: Albert King), and Increase societies appreciation and understanding of biomechanics with reference to critical societal problems (Chair: David Butler). The USNCB has requested the involvement of several members of the biomechanics community not currently involved in the USNCB to participate and develop these four areas.

On other fronts, the USNCB has increased its interactions with BMES and in particular, its relationship to the Annals of Biomedical Engineering. Members of the USNCB now serve as Associate Editors for the Annals, and as a result, the number of biomechanics contributions have increased. The USNCB also continues to organize and co-organize meetings (e.g., USNCB was a co-sponsor of the 1999 Summer Bioengineering Conference in Big Sky). 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 of Biomechanics, Dr. Morton Friedman (friedman.1@osu.edu).

*Louis J. Soslowsky
ASME Representative to USNCB*

Honors and Awards Committee

BED again produced an impressive array of recipients of honors and awards. Our Lissner Awardee was Professor Malcolm H. Pope from the University of Iowa, currently at the University of Aberdeen, Scotland, "for significant research activity in knee and spine biomechanics and the publication of more than 300 technical papers which have placed him among the foremost authorities in the field."

The 1998 Y. C. Fung Young Investigator Awardee was Professor Louis J. Soslowsky from the Departments of Orthopaedic Surgery and Bioengineering at the University of Pennsylvania in Philadelphia "for outstanding achievement in the pursuit of research in Bioengineering". His

research is in the areas of the structure-function relationship in tendons and ligaments. He has authored over 30 full-length publications and 85 abstracts, and has received funding from several sources. [Ed. - An in-depth description of Dr. Soslowsky's 1998 Fund Award can be found in the Fall 1998 Newsletter].

The Award for the Best Paper in our Journal of Biomechanical Engineering went to J. L. Emery, J. H. Omens, and A. D. McCulloch, "Strain Softening in Rat Left Venticular Myocardium," 1997, Vol. 119, pp. 6 - 12.

In the Ph.D. level student paper competition David M. Malicky, et al., from the University of Michigan won first place. Second place went to Michael A. Soltz, from Columbia University, and the third place was awarded to Maria Apreleva, et al., from the University of Pittsburgh. In the MS level competition the first prize was awarded to Tracy M. Vogrin, et al., from the University of Pittsburgh. Second place was awarded to Robin B. Mocarski, et al., from Syracuse University. Third place went to Jerome Fiechter, et al., from the Georgia Institute of Technology. The first prize on the BS level went to Jay S. Kimmelman, et al., from Harvard University. Second place was awarded to Jorge Gil, et al., from the University of Pittsburgh and in third place were Tanya G. Cole, et al., from the University of Alabama.

The Fellow membership rank was awarded during the year to Prof. J. Lawrence Katz from Case Western Reserve University and to Professor Larry A. Taber from Washington University.

As outgoing Chairman of the Honors and Awards Committee, I want to thank all members of the committee as well as other members of the BED who helped me keep our affairs in reasonably good order and made my job rather easy. I also want to thank the entire membership of the BED for their trust in me as I proceeded through the various positions of the Executive Committee and now as Chairman of this committee.

Congratulations and thanks to all!

*John C. Chato
Honors and Awards Committee Chair*

Please visit the ASME web site for updates on its latest activities

www.asme.org
and the Bioengineering web site
www.asme.org/divisions/bed

Summer Bioengineering Conference 1999

The 1999 Summer Bioengineering Conference was held June 16-20 at Big Sky Montana. Organized by the Bioengineering Division of ASME, and co-sponsored by the Food, Pharmaceutical and Bioengineering Division of AIChE, the Biomedical Engineering Society, and the US National Committee on Biomechanics, the meeting drew a record attendance of 456 participants, 3 exhibitors, and 75 guests for a total of 534 attendees. The setting proved to be ideal for both science and relaxation. Thanks are due to all attendees, who made the meeting such a success, and the many individuals who helped to organize sessions. Special thanks go to the Organizing Committee, whose diligence, hard work, and attention to detail made the experience enjoyable for all: Gerard Ateshian (Information), Dave Butler (Finances), Vijay Goel (Program), Roger Kamm (Local Arrangements) Kevin Meade (Student Poster Competition), Jerry Miller (Site Selection), Lou Soslowsky (Publication). We are also pleased to announce that Roger Kamm will serve as the Conference Chair for the 2001 Summer Bioengineering Conference. Keep mid-June 2001 open on your calendars for another great summer meeting.

*Bob Spilker
Conference Chair*

1998 Thurston Lecturer: Van C. Mow -- Abstract



Van C. Mow

Structure of Scientific Revolution in Bioengineering: A Historical Prospective. It is universally accepted that all perceptions and understanding are relative; that is they are relative to a set of rules, or paradigms, upon which the data is collected and interpreted. Therefore, an appreciation of how these rules, and thus paradigms, are developed can provide insights into the process of scientific struggles and discoveries, and how eventually new scientific paradigms become accepted. Thus, this lecture addresses three important topics; 1) lessons from the history of science; 2) the role of paradigms in normal science;

and 3) the confutation of old paradigms and the structure of scientific revolutions. Such ideas have been elegantly presented by Kuhn (1970) in his attempts to understand progress in science. This lecture will tell the story of how the first paradigms of science may have been developed by Greek philosopher-scientists like Thales, Pythagoras and Aristotle, to Hippocrates and Galen. Aristotle's paradigms (4th century BC) of the four elements (earth, water, air and fire), mechanics (rectilinear motion) and astronomy (flat, stationary geocentric circular orbits) dominated scientific thinking for nearly two thousand years. Hippocrates' paradigms (also 4th century BC) of the four humors (blood, phlegm, yellow bile and black bile), supported by Galen's paradigms (2nd century AD) of the four personalities (sanguine, phlegmatic, choleric and melancholic) dominated biomedical thinking for nearly as long. By the Age of Enlightenment, 15th-17th century, these paradigms have created a chaotic understanding of the universe, thus mandating the many contentious paradigm shifts. These paradigm shifts were brought about by scientific geniuses like Copernicus, Brahe, Kepler, Galileo and Newton in astronomy and mechanics, and by biomedical geniuses like Vesalius, Harvey and Leeuwenhoek and Malpighi in anatomy and physiology. The intense struggles weathered by these scientists were the preludes to the profound scientific revolutions yet to come, and can be traced to the activities to modern bioengineering endeavors. In this lecture, attempts will be made to capture the exhilarations of such triumphs in modern bioengineering research.

*Van C. Mow
Stanley Dicker Professor of Biomedical Engineering and Orthopaedic Bioengineering
Columbia University*

1998 Herbert R. Lissner Award



Malcolm H. Pope

The Bioengineering Division of the ASME is proud to announce Prof. Malcolm H. Pope as the 1998 H.R. Lissner Awardee. Dr Pope was born in London, England, and holds citizenship in both the United States and the United Kingdom. He received his H.N.D. degree in Mechanical Engineering from Southall College, London, his M.S. degree in Mechanical Engineering from the Univ. of

Bridgeport, Connecticut, a Ph.D. degree from the Univ. of Vermont, and a Dr.Med.Sc. degree in Medical Science from Gothenburg Univ. in Sweden. Pope was Professor and Director of Orthopaedic Research at the University of Vermont from 1972-1994. Pope was also a Distinguished Professor in the Departments of Biomedical Engineering, Orthopaedics, Preventive Medicine, and Mechanical Engineering. He was Director of the Iowa Spine Research Center and Chair of the Department of Biomedical Engineering at the University of Iowa. He is currently chair of Safety and Health at the University of Aberdeen, Scotland. Pope has been a member of the American Society of Biomechanics since 1979, Fellow in the ASME since 1980, a Fellow in the Institution of Mechanical Engineers (UK) since 1980, a Fellow in the Ergonomics Society since 1991, a Fellow in the American Institute for Medical and Biological Engineering since 1993, and a Fellow in the Royal Society of Medicine since 1994.

Pope was the 1980 Volvo Award recipient and has received prestigious honors in back research from the AAOS (Kappa Delta Award 1993, 1996), Eastern Orthopaedic Society, and the American Back Society. He has received the Sicut Müller Award (1990), the Vienna Award for Rehabilitation Research (1992, 1995), the ISB Muybridge Award (1992), and the Bristol-Meyer-Zimmer Award (1993). Pope was the recipient of the Groen Prize of the IMechE (1995), the ESS AcroMed Award (1995), and the Ergonomics Society Sir Frederic Bartlett Medal (1996). He is a past President of the International Society for the Study of the Lumbar Spine (ISSLS), and is internationally known for his work in the field of spine research, particularly EMG, ergonomics, and biomechanics, and is a Certified Professional Ergonomist. Pope is on the Editorial Board of Spine and Journal of Biomechanics. He has been an author and co-author of more than 300 articles, has organized many national and international meetings, and has been the principal speaker at numerous symposia.

1999 Y. C. Fung Award

ASME's Committee on Honors and Bioengineering Division are delighted to announce that Rebecca Rae Richards-Kortum, Ph.D. is the recipient of the 1999 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

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 outstanding achievements in the field of Bioengineering. To date, the Bioengineering Division has awarded eleven Y.C. Fung Young Investigator Awards. This is the first time the award has been given at the societal level.



Dr. Richards-Kortum

Dr. Richards-Kortum is an Associate Professor in the Department of Electrical and Computer Engineering and the Biomedical Engineering Program at the University of Texas at Austin. Dr. Richards-Kortum received her B.S. (1985) degree in Physics and Mathematics from the University of Nebraska- Lincoln, and an M.S. (1987) degree in Physics and Ph.D. (1990) degree in Medical Physics from the Massachusetts Institute of Technology. Dr. Richards-Kortum has received numerous honors and awards, including the Presidential Young Investigator Award (1991) and the Presidential Faculty Fellow (1992) from the National Science Foundation, and several awards for teaching excellence. Her research focuses on the application of optical spectroscopy for the detection of pre-cancer and other diseases, ranging from describing the basic physics of light propagation in scattering tissues to developing hardware and software systems for the collection and analysis of optical images in the clinical setting. Dr. Richards-Kortum has authored over 50 full-length publications, 4 chapters in books, and 90 abstracts, has 9 patents, and has received funding from the Whitaker Foundation, National Cancer Institute, and the National Science Foundation. In addition, Dr. Richards-Kortum has been a mentor to more than 20 masters and 10 Ph.D. students.

*Peter Torzilli
1999 Chair, Fung Award
Committee*

Nominations for the 2000 Y.C. Fung Award

The Bioengineering Division of the ASME is soliciting nominations for the 2000 ASME Y.C. Fung Young Investigator Award. The Y.C. Fung Award is a Society level award established by the Bioengineering Division 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. Only candidates whose names have been submitted in nomination will be considered for the award. Eligibility for the award will be restricted to candidates who have earned a Ph.D. or equivalent degree in any field of engineering, physics, medicine or life sciences. Candidates must have received their terminal degree within 7 years of their nomination for this award or be under 36 years of age on June 1st of the year in which they are nominated. Nominations must be made using the Nomination form and the nomination package must include a curriculum vitae of the nominee, a statement of the candidate's research goals (limited to two pages), and five letters of recommendation in support of the candidate. The letters should provide evidence of the candidate's past research accomplishments, future potential, and commitment to pursuing Bioengineering research. The award consists of a certificate, medal, travel expenses to the IMECE, and a \$1,000 honorarium. Ten copies of the candidate's package, including curriculum vitae, letters of recommendations, and the nomination form should be prepared and forwarded to the Chair of the Y.C. Fung Young Investigator Award Committee no later than February 1, 2000. Send nominations and inquiries to Maury Hull, Ph.D., Chair, Fung Award Committee, Professor Maury L. Hull, Department of Mechanical Engineering, Bainer Hall, One Shields Avenue, University of California Davis, CA 95616; mlhull@ucdavis.edu. Additional information can be found at <http://www.asme.org/divisions/bed>.

Bioengineering Standards Exploratory Committee

The BED Standards Exploratory Committee (BED-SEC) meet for the second time at the 1999 Summer Bioengineering Conference in Big Sky, Montana. The primary objective of the second meeting was to review discussions and activities related to determining if sufficient support existed for the establishment of an ASME Bioengineering Standards Committee within the ASME. This requires to move the committee from the divisional level (BED) to the society level (ASME). Participants in the meeting were from academics, industry and ASME.

Since the committee's initial meeting in November, 1998 at the IMECE, a call for participation in a bioengineering standards initiative was published in the ASME's Newsletter. More than fifteen positive responses were received via email, all encouraging the establishment of a committee to develop standards for biomechanical devices. The FDA's Center for Devices and Radiological Health (CDRH) responded by highlighting the need for standards for biomechanical devices, the need for more "academic" participation, and the role ASME could play in developing standards for biomechanical devices. The CDRH has a standards program for the development of "Consensus Standards" pertaining to the FDA Modernization Act of 1997 (www.fda.gov/cdrh/stdsprog.html).

The question was asked - "Should the BED and ASME develop standards for biomechanical devices?" After a significant discussion of the pros and cons, it was in general agreement among members present that we should proceed further. The remainder of the meeting was devoted to discussion how this should be done, who will be its members, and what will be the committee's specific "charge", function or expertise related to standards for biomechanical devices. The committee recommended sending a questionnaire, via email, to BED members asking what they consider the most important "aspect" of a standard, relative to biomechanical engineering, that the committee should consider for a first standard. Please see the survey on page 10.

If you have any additional questions, please email to TORZILLIP@HSS.EDU and provide your name, address, affiliation, phone/fax numbers, and email address. Committee activities and meetings will be emailed to all members.

*Peter A. Torzilli
Bioengineering Standards Exploratory
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Bioengineering Division 1999-2000

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Bioengineering Standards Exploratory Committee Survey

The Bioengineering Standards Exploratory Committee of the ASME Bioengineering Division would appreciate your assistance and guidance to achieve two goals:

1. specifying subjects for (possible) future standards in bioengineering
2. recruiting volunteers to serve on the committees that develop bioengineering standards

By providing the information requested below, you will help develop new resources for you and your colleagues. Your answers are strictly confidential.

Subjects for Future Standards in Bioengineering

Please provide your assessment on the types of standards that are currently needed. Under each of the following categories, please list specific subjects for standards that you and your colleagues would use.

1. Types of devices, specific devices, and device components (Examples: organ replacement, total hip joint, femoral stem, polyethylene)

2. Analytical methods for evaluating the integrity or performance of a device or procedure (Example: finite element analysis, statistical methods, reliability methods).

3. Experimental tests, test designs or models for evaluating the integrity or performance of a device (Example: biaxial testing, endurance testing, environmental testing).

4. other (please describe concisely)

Recruitment

If you are interested in serving on a standards committee and would like to receive more information, please provide the following information.

Name

Company/Organization

Address

Telephone/Fax

E-mail

If you have any additional questions, please contact: Alexander Majewski; ASME International; Three Park Ave / MS 22W3; News York, NY 10016; Tel: 212-591-7284; Fax: 212-591-7671; majewskia@asme.org

Fill this survey out online: www.asme.org/divisions/bed