



Dynamic Systems and Control Division Newsletter

James B. Dabney, Editor

Spring 2004



Chairperson's Corner

This is a period of change and transition for ASME: the Council on Engineering and the Council on Member Affairs have undertaken a significant re-organization effort to insure that ASME keeps pace with changing times, membership and business models. The principles underlying this reorganization are:

- Strategic plans and goals for Divisions, sections, student sections and to supporting units.
- Clear definitions and expectations of products and services offered by and available to divisions, sections and student sections.
- "Best Practices" will flow easily among all units, leading to: retention of young engineers; increases in membership; increased participation in programs of divisions, sections and student sections; more funds available for programs.

The Dynamic Systems and Control Division already operates in accordance with these principles, and offers a bright example to other Divisions through its partnerships, student member activities, and financial operations model. Let us look at some DSCD initiatives that represent "best practices" for the society.

DSCD has created a program aimed at attracting young members by offering to pay a substantial portion of the cost of attending its two major conferences, IMECE and ACC, for students whose papers are accepted for the conference. Funding for this initiative comes in part from NSF, with matching funds provided from the Division's custodial account. The program has been very successful, and has resulted in a significant increase in student primary membership in the Division. This program represents an important part of the future of the Division.

DSCD continues to set a sound example in the area of partnerships through its inter-society participation in conferences (ACC, AVEC, AIM, JUSFA) with a strong international flavor, and through its joint venture with IEEE in the ASME/IEEE Transactions on Mechatronics. This is along with the traditional DSCD participation in ASME IMECE and with the very successful ASME Journal of Dynamic Systems, Measurement and Control.

In an effort to promote new activities and partnerships, the DSCD Executive Committee has recently proposed revised Bylaws (approved in 2004), which allow for the for-

mation of Technical Committees: as an extension of the more successful and active existing Technical Panels; or as the result of a merger among Technical Panels with similar interests; or with the aim of recognizing new opportunities in emerging technical areas. The call for the formation of technical committees has already led to a number of proposals and the Executive Committee has recently approved the first proposal for elevation of the Technical Panel on Automotive and Transportation Systems to Technical Committee status.

Finally, an ad-hoc committee has been charged with the task of upgrading the strategic and business plan for the Division, a task that will be completed by the next IMECE in November 2004.

In summary, these are exciting times for the Division; thanks to the dedication of the very many active members, the Division is seeing an unprecedented period of activity. There is plenty of room for new ideas and we encourage our members, the young and the more seasoned alike, to take part in the growth and evolution of our community. It has been a pleasure for me to serve DSCD for the past fifteen years, and I plan to continue to do so in the future.

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Previous Chairperson's Comments



Suhada Jayasuriya

As the previous chair of the division I am honored to welcome all of you to our professional community in the DSCD. Remember that this is a volunteer organization and that if you have a desire and a willingness to get involved and contribute to the growth of our division there is absolutely nothing that will stop you from doing it. Of course, to function as a well organized division we have a set of by-laws to guide and direct our activities. The various offices held by the volunteers and how they are appointed are delineated in the division bylaws. If you haven't already done so I encourage you to visit the DSCD website at <http://www.asme.org/divisions/dscd> and read the bylaws of the division.

There are two main conferences that our members participate in. The American Control Conference (ACC) is held in the summer (June) and the International Mechanical Engineering Congress and Exposition (IMECE) in the Fall (November). Our members can organize invited sessions, submit contributed papers and organize workshops for the ACC. Although any one can organize an invited session it is highly recommended that you take advantage of the division's panel structure to get maximum exposure for your session ideas. This is an excellent way to get members involved and to also demonstrate your active involvement in the DSCD activities. It will give you an excellent forum to get to know how the division functions. The experience gained this way will stand you in good stead as you continue to rise in the division all the way to the executive committee. The sessions at the IMECE are usually organized through panels. At present ACC submissions are reviewed by a specially designated ACC program committee that is made up of volunteers from all its participating societies. IMECE submissions are usually handled within the DSCD by an appropriate technical panel.

I encourage all our members and especially the younger ones to get actively engaged in organizing sessions at the ACC and IMECE. The best advice I can give you here is to make sure that you concentrate on topics that are of interest to you and are currently working on and are of interest to the general DSC community. Include your own work in the session to setup a theme for what you organize.

The division as well as ASME is always looking for ways to get more industry involved in its activities. Your ideas on that are always welcome. Again organizing technical sessions with problems from industry would be most welcome. If you have specific ideas for which you might need a financial commitment please contact any one on the executive committee to discuss your idea. Currently, we are looking at the possibility of getting involved in a Control Expo where the format will be different from the ACC or the IMECE. The Control Expo will not be a forum to present your scholarly papers. What it would do is give you an opportunity to present a tutorial or a workshop on a topic that would be of interest to practicing engineers. Some of our members may want to get involved in this industry oriented Control Expo.

Currently the DSCD has some fifteen technical panels in a number of areas. Each panel has a chair and a vice-chair and is active to varying degrees. The panel activities in recent years have primarily been in organizing sessions at the IMECE Meeting and the American Control Conference. Effective and active technical panels are very important to the future of the DSCD. We encourage the members to consider a restructuring of our panel activities by forming new technical panels or merging with other panels to focus our efforts on current and emerging areas that are of interest to DSC members. In order to facilitate this restructuring we are in the process of elevating some of the more active technical panels into technical committees while at the same time providing a mechanism for our members to organize new panels that could later get elevated to a technical committee.

Finally, I want to thank those of you who have volunteered for various activities of the division for your dedicated service and I want to invite others to consider getting involved by expressing their interests - be it organizing a session, help with the news letter, reviewing papers, doing a special publication, serve on a committee, etc. You don't have to know someone personally to express your desire to volunteer. All that you have to do is send an e-mail with your coordinates and interests to someone on the executive committee.



NSF Dynamic Systems, Modeling, Sensing and Control Program: Status Report

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The Dynamic System Modeling, Sensing and Control (DSMSC) program supports research on the fundamental engineering concepts, theories and their experimental validations for modeling, analysis, simulation and control of dynamic systems, including study of new control methods, acoustics, vibrations, complex systems and kinematics relationships. This program also supports research on information technologies as related to smart and adaptive civil and mechanical systems at all physical scales, including study of new technologies for sensing and acquiring information; multiple and intelligent system functionality; and modeling, synthesis, simulation, and prototyping of intelligent systems and structures and their components. The DSMSC research aims at advancing the knowledge base for integration of sensors, actuators, controllers, and power sources for adaptive and mechatronic applications.

The DSMSC program has two integrated elements: Dynamic Systems and Control (DSC) and Sensor Technologies for Civil and Mechanical Systems (STCMS). DSMSC has two program directors: Dr. Shih-Chi Liu and myself. Dr. Liu is a permanent director and is responsible for the STCMS program element. I am a rotator from the University of California at Berkeley and have served for two years to manage the DSC program element.

The NSF overall annual budget has been between five and six billion dollars in recent years. About one tenth of it is allocated to the Directorate of Engineering (ENG). The budget for the Civil and Mechanical Systems (CMS) Division is about 12% of ENG and DSMSC is about one seventh of CMS. This determines the resource of the program available for what we

call unsolicited proposals, CAREER proposals and various supplements for existing awards. The success rate (# of awards/# of proposals) of the CMS division has been around 15%, but it is expected to be a bit lower for Fiscal Year 2004. While the annual budget for NSF as a whole as well as for the CMS both show an increase, the resource available to the core program is decreasing in recent years because some significant amounts are allocated to priority areas that cut across the entire NSF organization. This makes the management of disciplinary programs a challenge.

You may be aware how proposals are reviewed, but let me explain it. CMS proposals are reviewed by review panels. Depending the number of proposals, the panel size in terms of the number of specialists invited to serve on it may be anywhere from four to a dozen and may be more. We typically ask each panelist to study up to 12 or so proposals before a meeting takes place at NSF. Each proposal should be read at least by three reviewers and in most cases by four. Thus, if a panel is to review 24 proposals, there will be 8 (= 24 × 4/12) panelists. The panel discusses all proposals and normally classifies them into three categories: “Fund”, “Fund if possible” and “Do not fund.” Typically, top 20% make either “fund” or “fund if possible” category. Two criteria are used to evaluate each proposal: intellectual merit and broader impacts. Broader impacts include: promoting teaching; training and learning; broaden the participation of underrepresented groups; enhance the infrastructure for

research and education (facilities, instrumentation, networks, and partnerships); broad dissemination; and benefits to society. If you have not written an NSF proposal in recent years, you should check the NSF website for guidelines for proposal preparation including “broader impacts.”

The DSMSC program serves well for the DSCD/ASME community because of the matched interests. The community, however, should also take advantage of a variety of other funding opportunities available from NSF. As a program officer, I have been deeply involved in two solicitations: Sensors and Sensor Networks Initiative (NSF 03-512 and NSF 04-522) and Mathematical Sciences: Innovations at the Interface with the Sciences and Engineering (NSF 04-538), and I did my best to let the community know of these opportunities. There is no space to discuss provide any details of these solicitations here, but you can find such details at the NSF website. If you have missed these opportunities this fiscal year, you will most likely to have another opportunities in Fiscal Year 2005 and beyond. Make it sure that you periodically check <http://www.nsf.gov>.

I am often asked where the DSC program element is going. The field of dynamic systems and control has evolved over the past years, and in this regard it makes sense to look back last 40 years or so. Table 1 shows such an attempt. The second column of the table indicates a time when research on any particular methodology has begun. The third

column, Drivers/Applications, shows what may have motivated new methodologies and where new application opportunities are opening up. Finally, the last column provides the general technological background. The DSC program emphasizes control problems arising in civil and mechanical systems, and in this regard the third column is very important. Notice that as computation becomes more and more readily available at a reduced cost, applications of new control methodologies have broadened. The DSC/CMS program welcomes brilliant ideas relevant to any combinations of methodologies and drivers/applications in the table as well as new methodology and application that do not appear therein. The STCMS program element is relatively new, but sensors technology has captured the NSF wide interests as evidenced by the Sensor and Sensor Network Initiatives, and has become a global trend of multidisciplinary frontal research in engineering. Opportunities exist from new types of sensors and sensor networks for civil and mechanical systems to intelligent use of sensed data for broad-based engineering practices such as health monitoring and control. We look forward to receiving brilliant ideas from you.

Finally, I would like to take this opportunity to acknowledge the assistance of many volunteers from the community to serve on review panels. They provide invaluable assistance to program officers to make funding decisions that will maximize the utilization of limited resources.

Table 1: Evolution in the field of dynamic Systems and Control

<i>Decade</i>	<i>Methodologies</i>	<i>Drivers/Applications</i>	<i>Remarks</i>
<i>1960's</i>	Optimal Control & Estimation Stochastic Control	Aerospace & Military Power plants (DDC)	Expensive computation
<i>1970's</i>	Adaptive & Nonlinear Control; Sys Identification Digital Control	Process Cont Problems Robotics & Automation	LSI Technology
<i>1980's</i>	Robust & Multivariable Control Model Predictive Control	Automotive(e.g. engine) Manufacturing/machining Data Storage Industry	DSPs; MEMS Uncertainties
<i>1990's</i>	Intelligent Control Hybrid Systems Fault Detection	Semiconductor Manufacturing Communications Mechatronics	Miniaturization Networking Information Tech
<i>2000's</i>	Distributed Control Embedded Systems Large Scale Computation	Biomedical problems Energy problems Sensors/sensor networks Nano systems & devices Civil infrastructures	Globalization Biotechnology Nanotechnology Broadening applications Human-centric mechatronics

DSCD Web Pages Move to ASME Server

The Dynamic Systems and Control Division (DSCD) web pages have been moved to the ASME server and can now be found at the web site <http://www.asme.org/divisions/dscd/>.

The DSCD web pages are currently being updated and improved. The web pages will be maintained by the DSCD Secretary beginning Summer 2001. It is projected that the DSCD will be using these web pages more extensively in the future. For example, announcements, minutes of meetings, the DSCD Newsletters will be posted on this web site. Any corrections or suggestions regarding the DSCD web pages should be sent to the DSCD Secretary. ■

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Vice-Chair, DSCD Honors Committee

DSCD Members at NSF

Two DSCD members are now serving as "rotators" at the National Science Foundation (NSF). Professor Masayoshi Tomizuka is the Program Director for the Dynamic Systems and Control program and Galip Ulsoy (pictured above) is the Director of the Division of Civil and Mechanical Systems. Both expect to spend about two years at NS. Tomi started at NSF 9/02, and Galip started 2/03. They participated in several sessions at ACC 2003 to provide information to the DSCD community about funding opportunities, programs such as CAREER for young faculty, and initiatives such as the Sensors Initiative NSF program. initiatives and grants.

2005 American Control Conference

As the General Chairman of the 2005 ACC I like to extend this special invitation to all our DSCD members and its panels to take an active role in submitting papers and organizing sessions at the conference. The conference will be held in downtown Portland, OR for the first time in ACC's history. I am sure you will have a unique experience in Portland and I encourage you to get a head start on your paper submission. The days of the conference will give you an opportunity to enjoy Portland's famous Rose festival and numerous other attractions within walking distance from the hotel. Please refer to the call for papers elsewhere in this newsletter for all the important dates and some changes in ACC policy that will go into effect with the 2005 ACC. I look forward to the participation of many of you at the meeting. Mark your calendar for June 8-10, 2005.

Suhada Jayasuriya
General Chair, 2005 ACC

Manish Paliwal becomes Associate Editor



Manish Paliwal is the new Associate Editor of the DSCD Newsletter. Dr. Paliwal is currently the Director of the Biomechanics Laboratory, Orthopaedic Division in the Department of Surgery at the Southern Illinois University School of Medicine in Springfield, Illinois. He earned his Ph.D. from Southern Illinois University at Carbondale in 2003 while working for the NSF sponsored Center for Advanced Friction Studies (CAFS). He obtained a Master's Degree in Applied Mechanics from the Indian Institute of Technology (IIT), Delhi, India in 1996. From 1996 to 2001 he worked with Reliance Industries Limited, Mumbai, India, and provided management and technical services to the upcoming projects of the group. His research interests are in dynamic systems and controls, intelligent systems, experimental mechanics, theoretical and predictive modeling, biomaterials, biomechanics, friction materials and friction-induced vibration and noise.

The Dynamic Systems and Control Division Newsletter is published twice annually (Spring & Fall). News items, Call for Papers, conferences, as well as other items of interests are welcome from all DSCD Members. Please submit your items for publication by e-mail. For further information, contact:

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Important Websites

ASME Dynamic Systems and Control Division (DSCD):

<http://www.asme.org/divisions/dscd/>

American Society of Mechanical Engineers: <http://www.asme.org/>

American Automatic Control Council (AACC): <http://www.a2c2.org/>

ASME Journal of Dynamic Systems, Measurement, and Control (JDSMC):
<http://www.asme.org/pubs/journals/dynsys/dynsys.html>

IEEE/ASME Transactions on Mechatronics:

<http://www.ieee-asme-mechatronics.org/>

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2005 American Control Conference Call for Papers

<http://www.ee.washington.edu/conf/acc2005/index.htm>

The American Automatic Control Council will hold the Twenty-fourth American Control Conference (ACC) from June 8-10, 2005 (Wednesday-Friday) at the Portland Hilton in Portland, Oregon. It is time to start thinking about 2005 ACC as an outlet for your research and an opportunity to enjoy Portland, OR. Note the key dates and the new ACC policy that will go into effect with the 2005 ACC.

2005 ACC topics include, but are not limited to: robotics, manufacturing, guidance and control, power systems, process control, identification and estimation, signal processing, modeling and advanced simulation, model validation, fault detection, multivariable control, adaptive control, robust control, intelligent control, expert systems, neural networks, industrial applications of advanced control, control engineering education, and computer-aided design.

KEY DATES

Deadline for all submissions and proposals:	September 15, 2004
Notification of Acceptance/Rejection:	January 31, 2005
Final manuscript submission deadline:	March 15, 2005

Contributed Papers and Invited Sessions: Conference papers will be classified as either *contributed* or *invited*, and as either *regular* or *short*. *Regular* papers are to be a complete description of finished work. *Short* papers are to be an exposition of a novel idea or preliminary results. Invited Sessions are organized around a specific theme with invited authors. Papers in an invited session should present a cohesive and comprehensive focus on a relevant topic.

Workshops: Workshops that address topics related to the conference themes are welcome. We encourage state of the art workshops with high level of interest, impact, creativity and innovation.

Industry-Focused Tutorial Sessions: These sessions feature a one-hour tutorial presentation on an industrially-proven, but still relatively new technique, followed by a series of short presentations from industrial participants discussing the implementation, application, and benefits of the technique.

NEW ACC POLICY

- **PAPER SUBMISSION FORMAT:** all papers submitted to the ACC for review and publication after acceptance must be formatted in the standard 2-column Proceedings format. See the Author's Kit at the conference web site for Word and LaTeX style files. Regular and invited papers are limited to 8 pages and short papers to 3 pages. Papers exceeding these limits will NOT be reviewed.
- **PAPER PUBLICATION:** accepted regular and invited papers are limited to 6 pages and short papers to 2 pages. Papers exceeding these limits will be published in the Proceedings only after payment of a page overlength fee.
- **REGISTRATION FEE:** One regular registration fee at the advance registration rates must be paid by one of the authors before uploading the final version of the paper for inclusion in the conference proceedings.
- **ELECTRONIC PAPER SUBMISSION:** All submissions must be done electronically through the IEEE CSS conference submission web site (<http://www.paperplaza.net>).
- **TUTORIAL & SPECIAL SESSIONS:** See website for separate guidelines on page limits.

The conference will take place during the famous Portland Rose Festival with an opportunity to watch the nation's second-largest all-floral Parade from the hotel. Nestled in the heart of the Willamette Valley, Portland sits squarely between the Pacific Ocean (90 minutes by car) and the 10,000 plus foot tops of the Cascade Mountain Range (Mount Hood is 1 hour by car). A 45 minute drive east from town will get you to the middle of the Columbia Gorge National Scenic Area, a place of breathtaking beauty which includes the 620-foot Multnomah Falls. Portland's downtown area is scaled to human dimensions. The blocks are short, just 200 feet long. Cafes, restaurants, bookstores, galleries and specialty stores are waiting around every corner. Green suited "Portland Guides" walk through downtown streets day and night answering questions and helping with directions. Tri-Met, Portland's mass transit system, and MAX, Tri-Met's light rail system allow free rides in the Fareless Square, a region encompassing much of the downtown area and extending into the Lloyd District, including the Oregon Convention Center and the Rose Quarter. One hundred acre Washington Park in the west hills above Portland encompasses the International Rose Test Gardens with more than 400 varieties of roses, the peaceful contemplation of the Japanese Gardens and the Oregon Zoo with its world-class elephant exhibit.

For complete conference information, visit the conference website at the address given above. You may also contact the General Chair: Suhada Jayasuriya, (979) 845-0271, sjayasuriya@mengr.tamu.edu, or the Program Chair, S.N. Balakrishnan, (573) 341-4675, bala@umr.edu.