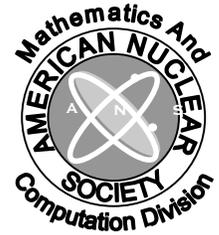


AMERICAN NUCLEAR SOCIETY MATHEMATICS AND COMPUTATION DIVISION



May, 2002

<http://www.mcd.ans.org/newsletters>

MESSAGE FROM THE CHAIR

As my year as division chair winds down, I'd like to pass along some thoughts on Ely, on computers and the role of the M&C Division, and on our meetings.

Farewell, Ely

We recently lost one of our most respected and distinguished members, Ely Gelbard. Ely's career spanned nearly 50 years and involved pioneering work in the areas of reactor physics and Monte Carlo methods, first at Bettis and then at Argonne. He was one of the giants of our profession; while his legacy remains, we will miss his presence.

I knew Ely for 20 years, as a colleague and friend. One of the most enjoyable portions of my own career was working with Ely for a few years at Argonne. He truly enjoyed his work, was always inquisitive and eager to learn more, and was never satisfied until all aspects of a problem were thoroughly investigated and understood. He was dedicated, working long hours 6 or 7 days a week even after retiring from Argonne at age 70+. Ely's enthusiasm, integrity, and professionalism were contagious, affecting everyone who knew him and worked with him.

The Mathematics and Computation Division and the Reactor Physics Division will be organizing a tribute to Ely Gelbard for the 2002 ANS Winter Meeting in Washington.

1,000,000 X, and Still Going...

As I write this, the "Q" system is being installed at Los Alamos, a 30-TeraOp supercomputer for the ASCI Program. For newcomers to scientific computing this may be routine, but to those of us who struggled with slide-rules in the pre-calculator, pre-PC days, this is an event. The Q system is about 1,000,000 times faster than the first supercomputers I used 25 years ago. It's hard to believe that what used to be year-long calculations can now be done in a few seconds. Of course, that speedup doesn't apply to ordinary calculations, but to large ones that can be carried out in parallel. Nevertheless, the progress is remarkable, and shows no sign of stopping. A 100-TeraOp system should appear within a few years, and petaflop systems are being planned.

Thinking about the progress in supercomputers led to other comparisons: My laptop PC is 10 times faster, has 10 times more memory, and is 10,000 times cheaper than the CRAY-1 supercomputers, yielding a gain of 1,000,000 in cost-effectiveness. The incredible increases in speed and reductions in

cost invite questions about our profession: Why do we need new mathematical and computational methods if computers are improving so much? Why not just wait a while, for the faster computers? Naïve questions, yes, with complex answers.

While there have been dramatic increases in CPU speed and in memory capacity, other parts of computing systems have not advanced at the same rates. Interconnects between memory and the CPU, in particular, have not shown such large increases in speed or capacity. The latency for memory access has actually significantly increased (in terms of CPU clock cycles) over the last few decades. Computer architects have compensated somewhat by introducing new architectural features, such as wider memory busses and multiple levels of cache memory. (A related issue, the death of vector computers, is largely due to the failure of memory access rates to keep pace with CPU improvements.) As a result, the new computers have new architectures. Mathematical methods and computational algorithms developed for the "old" architectures will not necessarily be effective on the "new" architectures. This is most obvious for scalar codes which are simply ported to the new parallel machines – there is typically no parallelism, hence no speedup. To fully take advantage of the new machines requires the development of new mathematical methods and new computational algorithms.

Many members of the Mathematics and Computation Division have spent their careers developing new approaches for solving nuclear engineering problems on advanced computers. 1,000,000 X gains in computer speed make this more necessary, rather than less.

Publish Your Work!

Our M&C sessions at national ANS meetings continue to provide solid technical content and are reasonably well-attended. However, the most important thing that you could do to help the division and the ANS is: Publish a paper on your work and present it at one of the national meetings. While writing a paper involves some effort and presenting it at a national meeting involves time and expense, it is worth the effort, with benefits for you, the M&C Division, and the ANS.

Forrest Brown
Chair, M&C Division, 2001-02

REPORT

EXECUTIVE COMMITTEE MEETING

RENO, NV, NOVEMBER , 2001

Nominating Committee (Andy Smetana)

The following individuals were nominated by the committee:

Vice-Chair	Roger Blomquist	RNBlomquist@anl.gov
Treasurer	Glenn Sjoden	joedean@sprintmail.com
Secretary	Piero Ravetto	ravettop@libero.it

Executive Committee:

Cassiano R. E. de Oliveira	c.oliveira@ic.ac.uk	Roger Webb	rogier.webb@srs.gov
Tom Sutton	sutton@kapl.gov	Madeline Anne Feltus	Madeline.Feltus@hq.doe.gov
Kevin Schwinkendorf	kevin.schwinkendorf@fluor.com		

The nominating committee was comprised of Andy Smetana (Chair), Bill Martin, Richard Sanchez, Jim Rathkopf, Elmer Lewis, and IK Abu-Shumays.

Finance Committee – Steve Nolen

The following expenditures were approved: A one time \$3000 gift (Winter 2001) and \$1000 gift (Winter 2002) to the Dannel Endowment, \$100 for a plaque for the Distinguished Service Award, 25% of the final net proceeds from the September Topical be approved for transfer to Reactor Physics Division, and \$250 be given to the Penn State Student Conference (a Summer 2002 budgeted item)

Honors and Awards Committee. – Paul Turinsky

Prof Turinski reported that Prof. E. E. Lewis received the Distinguished Service Award. He also announced that Prof. Marv Adams will be inducted as an ANS fellow. Prof. Rizwan Uddin suggested that the Division consider nominating Dr. Y. Y. Azmy for the rank of ANS fellow. A brief discussion followed in which many present concurred and in which it was suggested that the nominating committee should look at the Division membership for the specific purpose of actively identifying Division members suitable for nomination to various ANS honors. **Action Item:** Bill Martin is to continue seeking to prompt a major gift from SAIC in support of the Pomraning Endowment. If the efforts ultimately do not work, Paul Turinski would talk to the ANS President, Gail Marcus, regarding making progress on the Endowment an ANS matter.

Membership Committee –Madeline Feltus

The Division remains steady at about 900 (actually 907 members, slightly up from 836 in the previous report Paul Turinski suggested that prompting should be done to induce potential division members to join or re-join.

2001 Topical Meeting

A highly congratulatory letter was received from Dr. Enrico Sartori, strongly praising the organizers of the meeting (specifically naming Dr. Jeffrey Borkowski) for the truly international nature of the gathering and for the successful cooperation between all parties involved. The committee members made a point to add their voices to that of Dr. Sartori in congratulating Jeff Borkowski and Scott Palmtag for an extremely well done job and to thank Studsvik-Scandpower and the Idaho Section of ANS for their support.

Program Committee – Ali Haghighat

Alireza Haghighat reported that at this meeting seven sessions were sponsored or co-sponsored by the M&C division. Notable among these were the two special sessions on “Advanced Nodal Methods and the Legacy of Allan F. Henry.” A special session on the convergence of Monte Carlo methods has been approved for the 2002 Winter Meeting and is organized by Roger Blomquist and Forrest Brown. The continuing discussion on the papers review method (see minutes from the Milwaukee meeting) will continue at the next meeting (Florida). The reason for this postponement is the low number of papers that had to be reviewed for this conference and thus the lack of a significant amount of new data for a meaningful discussion.

[The full minutes of this meeting are available at <http://www.mcd.ans.org/governance>.]

Editor's Message: This newsletter will be issued twice a year and can be accessed electronically at <http://www.mcd.ans.org/newsletters>. Please send your news and *constructive* comments to me at Todd Palmer, Oregon State University, Department of Nuclear Engineering, 116 Radiation Center, Corvallis, OR 97331-5902; FAX (541) 737-0480; email: palmer@enr.orst.edu; or call (541) 737-7064.

M&C 2003 – GATLINBURG, TENNESSEE

To mark the beginning of the second century of nuclear science, the American Nuclear Society's Mathematics and Computation Division 2003 Topical Meeting is organized around the theme: *Nuclear Mathematical and Computational Sciences: A Century in Review, A Century Anew*. The conference will be held at the Park Vista Hotel, Gatlinburg, Tennessee, April 6-10, 2003. It is co-sponsored by the American Nuclear Society's Reactor Physics, and Radiation Protection and Shielding Divisions, as well as the ANS Oak Ridge/Knoxville Local Section, Oak Ridge National Laboratory's Radiation Safety Information Computational Center, the Nuclear Energy Agency of the OECD, the Korean Nuclear Society and the Canadian Nuclear Society.

As the Conference's title suggests, the technical sessions are arranged in two major components. The *Anew* component includes the typical mix of contributed papers in regular sessions and invited papers in special sessions. Members of the Technical Program Committee have been extended an invitation to help organize special sessions on timely topics, and to stimulate paper submission by colleagues. As customary for M&C topical meetings, *full* papers must be submitted for review by October 21, 2002. Additional instructions to authors, including format requirements, will be posted on the Conference's web site (see below) at a later date.

The *Review* component of the conference is a marked departure from the standard Plenary Session format. It is comprised of eight invited lectures by world-renowned leaders in selected topics. Each half-day of conference sessions will commence with one such lecture extending for one hour, followed by a 15-minute Question/Answer session, a 15-minute break, then the regular and special sessions proceed.

The complete list of topics and invited lecturers is:

1. Deterministic Methods for the First-Order Transport Equation
Ed Larsen (Univ. of Michigan) & *Jim Morel* (Los Alamos National Lab)
2. Deterministic Transport Methods of the Second Order
Elmer Lewis (Northwestern University)
3. Monte Carlo Methods
Jerome Spanier (University of California at Irvine)
4. Reactor Core Methods
Kord Smith (Studsvik Scandpower)
5. Resonance Theory in Reactor Applications
R. N. Hwang (Argonne National Lab)
6. Reactor Kinetics and Dynamics
Jack Dorning (University of Virginia)
7. The Role of Perturbation Theory in Sensitivity and Uncertainty Analysis
Dan Cacuci (Forschungszentrum Karlsruhe, Germany)
8. Criticality Safety Methods
Elliott Whitesides (Oak Ridge National Lab - retired)

The topics were selected to provide a broad coverage of the major areas of research in nuclear mathematical and computational sciences in the twentieth century. The lectures will capture for future students and researchers a snap shot of what the field looked like at the turn of the century, and how it got to that point since its inception. The stature of the invited lecturers promises to make this lecture series a unique opportunity for nuclear scientists and engineers to "hear it from the lion's mouth"!

The conference's web site is:

<http://www-rsicc.ornl.gov/mc2003/mc2003.html>

It is presently under construction and will be updated with new information as it becomes available. Please bookmark and visit it occasionally for news and updates. Comments and suggestions are most welcome.

Yousry Azmy
Technical Program Chair, M&C 2003

IN MEMORIAM – ELY GELBARD (NOVEMBER 6, 1924 - APRIL 18, 2002)

Dr. Ely M. Gelbard was the son of immigrants. His undergraduate work was at the City Colleges of New York and after World War II he earned his Ph.D. in physics from the University of Chicago. During the war, he served in the US Army Air Corps as a radar technician. He was a Senior Scientist at Argonne National Laboratory and a Fellow of the American Nuclear Society.

Ely started his postgraduate career when the use of digital computers to solve the neutron balance equations for fission reactor core design and analysis was just starting to receive wide application. At Bettis during the mid 50's and the 60's, he participated in the efforts which put the numerical methods for the solution of the finite difference form of the neutron transport equation on a firm mathematical basis, and he devised several approximation schemes that were suitable for numerical methods and also developed efficient algorithms for their solution. While at Bettis, he earned international stature in the field, authoring important papers in many variants of the solution procedures (spherical harmonics, S_n , synthetic methods, and Monte Carlo), including the book, *Monte Carlo Principles and Neutron Transport Problems*, with J. Spanier.

Since 1972, when Dr. Gelbard joined Argonne National Laboratory, fast reactors have been the focus of ANL's reactor program, with its emphasis on more accurate computation of the neutron spectrum. His work in this area produced fundamental advances in the analysis of neutron streaming, collision probabilities, improvements in Monte Carlo methods, and neutron diffusion and transport within the nodal approximation.

He also brought improved iterative solution strategies to bear on the equations of single-phase computational thermal-hydraulics analysis of passively safe metal-cooled reactor systems. He was consulted by many at ANL, at other labs, and at universities on a wide variety of technical issues, and invariably provided important insights.

Ely's sustained record of high productivity of the highest quality technical work attracted a series of bright and vigorous visiting scholars and students whose participation magnified his work. He excelled at distilling complex technical issues to their essence, then performing the relevant mathematical analysis and, finally, computationally confirming the analysis. Ely was always careful, honest, and thoroughly scrupulous in his work. He earned the ANS Special Award for Computer Methods for the Solution of Problems in Reactor Technology, the ANS Mathematics and Computations Division Distinguished Service Award, the ANS Reactor Physics Division Eugene Wigner Award, and the University of Chicago Distinguished Performance Award.

In spite of his great stature and many accomplishments, Ely was a mild and modest gentleman who always gave full credit to others' work, and was very approachable and an excellent listener. His technical questions at meetings were insightful, probing, and gentle. He also pursued the understanding of others' points of view in personal and political matters with both intellect and sensitivity. Ely's restaurant adventures at meetings and other venues have provided a rich array of gastronomic experiences and many fond memories to his many friends in our profession.



Dr. Ely M. Gelbard died at home on April 18, 2002.

[Thank you to Roger Blomquist of Argonne National Laboratory for his fitting tribute to Ely.]

UPCOMING MEETINGS

*2002 ANS Summer Meeting
The Revival of the Nuclear Power Option
Hollywood, FL, June 9 – 13, 2002*

For more information, see <http://www.ans.org/meetings/pdfs/2002/am2002-cfp.pdf>

*PHYSOR-2002
ANS International Topical Meeting on Advances in Reactor Physics and Mathematics and Computation into the Next Millennium
Sheraton Walker Hill Hotel, Seoul, Korea, October 7-10, 2002*

Cosponsored with the Reactor Physics Division. For more information see <http://physor2002.kaist.ac.kr>

*2002 ANS Annual Meeting
Building the World Nuclear Community - Strategies for the Deployment of New Nuclear Technologies
Washington, DC, November 17-21, 2002.*

For more information, see <http://www.ans.org/meetings/pdfs/2002/wm2002-cfp.pdf>.

*SNA 2003
International Conference on Supercomputing in Nuclear Applications
September 22-24, 2003, Paris, France.*

Cosponsored by CEA, SFANS, co-organizer: OECD/NEA. For more information - email SNA-2003@cea.fr, and see <http://SNA-2003.cea.fr>

[More information about relevant conferences can be found at <http://www.rsicc.ornl.gov/Newsletters/> and <http://www.ans.org/meetings/>]

2000-2001 ANS MATHEMATICS AND COMPUTATIONS DIVISION OFFICERS

Chair:	Forrest B. Brown (LANL, 505/667-7581, fbrown@lanl.gov)
Vice-Chair/Chair Elect:	Richard Sanchez (CEA de Saclay, 33-01-5908-5404, richard.sanchez@cea.fr)
Secretary:	Abderrafi Ougouag (INEEL, 208/526-7659, oom@inel.gov)
Treasurer:	Steve Nolen (LANL, 505/667-7267, frodo@lanl.gov)
Outgoing Chair	Andrew O. Smetana (Savannah River Site, 803/725-4192, andrew.smetana@srs.gov)

EXECUTIVE COMMITTEE

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2002	Richard Sanchez (CEA, +33 (0) 1 5908 5404, richard.sanchez@cea.fr)
2003	Bernadette L. Kirk (ORNL, 423/574-6176, blk@ornl.gov)
2003	William R. Martin (Univ. of Michigan, 734/764-5534, wrm@umich.edu)
2004	Piero Ravetto (911-564-4443, ravetto@oolito.it)
2004	Barry Ganapol (U. Arizona, 520/621-4728, cowboy.ganapol@ncc.arizona.edu)
2004	Nam Zin Cho (KAIST, 82-42-869-3819, nzcho@sorak.kaist.ac.kr)
2004	John Wagner (ORNL, 865/241-3570, wagnerjc@ornl.gov)

BOARD LIAISON

Larry Foulke (Bettis, 412/476-7511, larry.r.foulke@verizon.net)

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