SOCIETY GENERAL BUSINESS

President’s Report

Just as I write these lines, the Nobel Prize in Physics has been awarded to Rainer Weiss, Barry Barish and Kip Thorne for their contributions to the LIGO detector and the observation of gravitational waves. This was no surprise to me, as I witnessed the announcement of the first signal via a live video link on Feb. 11, 2016 at our lab. Seeing the two signals from the Hanford and Livingston detectors recorded on Sept. 14, 2015, and how nicely they fit on top of each other, it was immediately obvious that this was a real signal and not fake effect. It happens seldom in history that a groundbreaking discovery leading to a Nobel Prize can be described by two waveforms of a few seconds recorded at 16 kHz, which translated into audio sound like a little chirp. It is amazing to me that the analysis of these little waveforms led to the determination of the black hole masses, their distance from us, and the incredible amount of energy radiated via gravitational waves during the merging process of an equivalent of three solar masses.

Are you interested in having a look yourself at the original data? If so, there is a great way to do so: IEEE DataPort. This new tool is an online repository to share scientific data. I mentioned it in an earlier article, and you will find a dedicated article about IEEE DataPort in this newsletter. While the tool was initially just a theoretical possibility, it now is filling slowly with rich and exciting data, some of which led to the Nobel Prize. You will find the Gravitational Waves Discovery Data at https://ieee-dataport.org/documents/gravitational-waves-discovery-data. You can obtain a free beta tester account and download the data in HDF5 format. After five minutes I was able to see the original waveforms, quite an exciting moment for me. I hope that more people from our community share their scientific data in such a way. This not only gives you an organized way of storing experimental data which can be referenced by a Digital Object Identifier (DOI), but it also can lead to alternative (and maybe even improved) analysis of your data by other groups.

The IEEE NPSS elections took place and the results have been announced. I welcome the new AdCom Members David Abbott (CANPS), Christopher Deeney (PSAC), Frank Hegeler (PPST), Jeffrey Black (RE) and Craig Woody (RI). We look forward to a fruitful collaboration with you over the next years. On the other side I would like to thank the Elected Members who are finishing their AdCom term in 2017. These are Martin Grossmann (CANPS), Steve Gold (PSAC), Weihua Jiang (PPST), David Hemmila (RE) and Dick Lanza (RI). I also thank the TC chairs who leave us this year: Martin Purschke (CANPS), Paul Marsden (NMISC) and Andreas Neuber (PPST). Thank you for all your efforts, it was a wonderful time working with you. While Martin and Steve will stay in AdCom in other functions, the others will leave AdCom by the end of 2017. Thank you Weihua, David and Dick.

2018 will again be full of exciting IEEE NPSS conferences. IPAC will come to Vancouver, Canada; RT to Williamsburg, VA; ICOPS to Denver, CO; NSREC to Waikoloa Village, HI and the NSS/MIC to Sydney, Australia. More information can be found on our conferences website at http://ieee-npss.org/conferences. Maybe one or another of our conferences might be of interest to you. Most conferences offer a companion program, so maybe your partner would be delighted to join you to some of the places, as my wife will do with me.

This leaves me wishing you a prosperous and happy year 2018; maybe you will find your own dataset leading to one award or the other.

Sincerely,

Stefan Ritt, IEEE NPSS President

Stefan Ritt, IEEE NPSS President, can be reached at the Paul Scherrer Institute, CH-5232 Villigen PSI, WBMW/140, Switzerland; Phone: +41 56 310 3726; E-mail: stefan.ritt@psi.ch

SOCIETY GENERAL BUSINESS
Continued on PAGE 2
The NPSS News AdCom met in Atlanta, Georgia on October 28th, with committee meetings held on October 27th. Our society continues in good financial shape, but we, along with most IEEE societies are seeing large income drops from our publications in particular and also from our conferences. Our conferences have been successful this year but they are seeing expanded problems with visas, including canceling of already-granted visas as people were about to board planes. And some conferences are seeing people simply not wanting to come to conferences in the US, even with accepted papers, because of the uncertain situation for people holding visas.

Conferences are also continuing to close later than is acceptable. Please work with our treasurer, Ralf Engels, r.Engels@fz-juelich.de, and Ron Keyser, ron.keyser@beckman.com, assistant treasurer, to get conferences closed within a few months of the conference’s end.

The tool developed by NPSS to track conference budgets is now being deployed for all IEEE conferences to use.

Our President, Stefan Ritt, has attended many conferences over the last six months. He strongly advocates ‘green’ conference attendance, where practical, use media such as WebEx, BlueJeans and Vidyo. Try them! He also noted that 67% of sponsored conferences were held in Regions 7-10 as well as 93% of technically sponsored conferences. He also noted that the EU General Data Protection Regulation goes into effect on May 25, 2018. This will mean rethinking how IEEE handles data privacy issues.

The projected IEEE budget deficit forecast earlier is expected to be closer to $1.5 billion that to the $2.2 billion originally projected.

Our technical committees report good conferences with a number of “firsts.” The First Pulsed Power and SOFE conferences were held outside the U.S, in Brighton, UK, and Shanghai, China, respectively. Both had good attendance and excellent technical and social programs. Working abroad did not create any particular difficulties especially as both conferences worked with MCE, the IEEE Meetings, Conferences and Events service offered through IEEE.

The NSS/MIC conference used the new Conext software developed by EventClass with great success for handling receipt and review of abstracts as well as registration. Problems were fixed within 24 hours in most cases. While this is an excellent software package for large conferences, our smaller conferences are using Indico, developed and maintained by CERN, with equal satisfaction.

Note that our new contact person at MCE is Esther St. Eloi, reachable at +1 732 562 3878.

Suzanne Kuehn and Dick Kousky’s help, has updated our web site. Please let one of them, or me, know if you see needed changes.

We are also proud to announce the 2017 NPSS Society Awards with Ron Keyser to receive the Richard Shea Award, Rav I乔士的 Merit Award, and Chao Chang the Young Investigator Award. Look for more detail in March.

ADCOM ACTIONS

- It was moved by the RISC technical committee, that NPSS Technically cosponsored Color 18. Passed unanimously

- It was moved by NMICS that NPSS technically cosponsored the 2018 PARMIR/SPECT AIR conference to be held May 21-23 in Isla del Barril, Italy. We have had past experience with this conference. Passed unanimously.

- PSAC moved that NPSS technically cosponsor the first Asian-Pacific Symposium on Plasma and Terahertz Science and Technology. This is planned as a biennial conference and the first chairman is well-known to NPSS. Many NPSS members will be on the program and advisory committee. Motion passed with two abstentions.

- It was moved by the Radiation Effects TC that an Early Career NSREC award be created. This will be a conference-level award. The motion passed unanimously.

- Motions from the Finance Committee

- It was moved that the Conference Childcare grants become an NPSS-supported activity at the current fiscal levels (up to $2000 per conference; up to $400 per family for NPSS financially sponsored conferences). For the purposes of Childcare Activities any combined NPSS conferences will be considered as separate conferences.

- It was moved to change the wording in the NPSS Reimbursement Policy as follows: “… Functional Committee chairs, liaison members and EOCs who need travel support beyond AdCom meetings held to their positions shall, at the last AdCom meeting of the year, provide the NPSS Treasurer with the details of the budget of the support which they will need the following year. The motion passed.

- It was moved that the following policy codification be added to the NPSS Reimbursement Policy: Liaison members of AdCom are funded by NPSS to attend one AdCom meeting each year. NPSS Presidents may make exceptions as they deem necessary. The motion passed unanimously.

- FinCom moves to implement the following policy for Technically Cosponsored Conferences: AdCom will determine for each individual TCS conference whether NPSS will pay the MCE TCS fees for conferences considered for Technically Cosponsored (TCS). The motion passed with 1 yes, 6 no, and 4 abstentions.

- It was moved that the CANPS conference award be elevated to the level of other NPSS Technical Committee awards for outstanding contributions to the field of that technical committee. This award will become an NPSS Society Award with the amount increased to $5000. The award will be given at each Real-Time conference (Biennale). Passed with one abstention.

- The Awards Committee endorsed the following changes to the NPSS Ronald J. Jaszczak Graduate Award as proposed by Ron Jaszczak:

- Change the current award granted over a 3-year period to an annual award.

- Initial annual Award to be presented in 2019

- Eliminate US. citizenship requirement

- Increase maximum eligibility age to 35 years old

- Allow nominees from both Universities and Research Institutes

- Nominee must be a regular or student member or have applied for membership at IEEE NPSS by nomination submission deadline date

- Simply nominees review process (i.e., nominee to be selected directly by the IEEE NPSS Award Committee)

- Allow NPSS AdCom to consider increasing Award amount should IEEE Foundation increase maximum Award allowable amount in the future.

The motion carried unanimously and will be brought forward to TABAC for final approval.

Stefan Ritt introduced a discussion of a Code of Ethics for NPSS meetings. This will be addressed further at meetings in 2018, but a link to the IEEE Code of Ethics is required on all conference web pages. How we will implement this at conferences will also be discussed further.

AdCom will hold its first meeting of 2018 in Santa Fe, NM with a retreat on Friday, March 9th and a regular meeting on Saturday, March 10th.

As Stefan has already, I add my thanks to his to outgoing AdCom members and TC chairs, and look forward to welcoming our new members in 2018.

Albre Larse can be reached by E-mail at a.larsen@ieee.org

Charles Humeyer
FSTC Chair

Technical Committees

Martin Purschke
Chair, CANPS Technical Committee

The CANPS committee, 2018 conference chairman David Abbott, and Jefferson Lab conference support have been busy preparing the infrastructure for the next Real-Time Conference in the wonderful Colonial Williamsburg conference facilities in Virginia. We are in the final stages of putting together the conference poster, short courses, web sites, abstract submission pages, and so on. By the time you read this, the abstract submission will open. We hope for a good quality and diverse selection of abstracts for an outstanding scientific program. Head over to https://indico.cern.ch/itc/10101.html for more details.

With my term as CANPS chair coming to its end, I will pass the baton on to the next chairman Martin Grossmann from the Paul Scherrer Institute (PSI) in Switzerland. Martin will lead the committee through the next year events and the two Real-Time conferences in 2018 and 2020. Lots of success and all the best wishes, Martin.

It is my turn to thank each member of CANPS for your hard work and commitment, and all of you for being such an agile and diligent group—at times, we held committee meetings ahead of the Padova conference with less than 24 hours notice and still had more than 20 people connected. Thank you all very much.

I timed the sequence of student award winner articles from the Padova Real-Time so that we would close them out during our meeting as chair. As our last contribution from the 2016 conference, we have the fifth article, this one by Chong Liu. Chong holds a bachelor’s degree from the University of Science and Technology of China with a major in Applied Physics. He is now working on his Ph.D. designing novel readout electronics for a high performance, Time-of-Flight enhanced PET detector module. Time-of-Flight PET is an area of intense research. It would give us better image quality, or allow us to reduce the applied radiation dose to the patient. Read the article by Chong Liu later in this newsletter about his progress towards this goal.

Martin Purschke, Chair of the CANPS Technical Committee, can be reached by E-mail at purschke@fnl.gov.

FUSION TECHNOLOGY

SOFE 2019

Preparations are well underway for the 26th Symposium on Fusion Engineering, SOFE 2019. The conference, which highlights the engineering and technology of fusion research, will be held on June 2nd through June 6th, 2019 at the Sawgrass Marriott Resort near Jacksonville, FL, USA. IEEE MCE is assisting in the arrangements and finalizing the venue contracts.

Two minicourses, one on plasma-material interactions; and another on 3D radiation transport in fusion devices will occur on Sunday, June 2nd as well as evening receptions. A conference banquet is

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Secretary’s Report
planned for Wednesday evening. Once again, we plan to publish selected papers in a special issue of IEEE Transactions on Plasma Science. A technical program consisting of invited plenary talks with oral and poster contributions is planned. In addition to the traditional SOFE program, a special session on materials and additive manufacturing is envisioned.

A conference treasurer and a publications chair were selected during the summer, and we are now seeking a volunteer for marketing and publicity. The initial conference budget estimate was submitted to the NPSS treasurer.

Charles Neumeyer, Chair of the Fusion Technology Committee, can be reached by E-mail at Neumeyer@pppl.gov.

Heartfelt congratulations to all the Technical Committee award winners. This year’s winner of the Bruce Hasegawa Nuclear Medicine Imaging Award is Hadi Fayad from the Université de Bretagne Occidentale, Brest, France, for his contributions to the field of molecular imaging in radiotherapy and multimodality imaging applications.

The 2017 Edward J. Hoffman Medical Imaging Scientist Award was presented to Richard Caron (Yale School of Engineering & Applied Science) for his contributions to quantification in Proton Emission Tomography including image reconstruction, tumor kinetic modeling techniques, and development and application of mathematical and statistical methods for novel radiopharmaceuticals. Thank you to all those who have either volunteered or proposed candidates for awards — I would like to encourage you all to nominate worthy colleagues for the many awards which are available from IEEE and NPSS with deadlines at end of January 2018. More details can be found at http://ieee-npss.org/awards/npps-awards/ and http://www.ieee-npss.org/awards/npssawards/.

Finally, this will be my last newsletter article as chair of NMISC. See Sung Lee from Seoul National University will be taking over from January 2018.

At the time of writing, what promises to be a very exciting IEEE NPSS Nuclear Science Symposium and Medical Imaging Conference (NS/MIC) is about to take place in Atlanta. Thanks to the organizing committee for all the hard work that has gone into arranging it. Looking forward, next year’s meeting will be in Sydney, Australia, with Anatoly Rosenfeld as General Chair and Steve Veleiko and Taiga Yamaya as MIC Chair and Deputy Chair. 2019 will see the meeting come to the UK for the first time. It will be held in Manchester with me as General Chair and Dimitri Darambam and Samul Satti as MIC Chair and Deputy Chair. Many of you will also be interested in the 2018 PPST/M and SPIE/AMERICAN NUCLEAR AND MEDICAL IMAGING SCIENCES

Paul Marsden
NMISC Chair

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NPSS News

Certification. Eligibility. Member of the IEEE NPSS who at the time of the nomination is within the first ten (10) years of his or her career within the fields of interest of NPSS. Basis for judging: Three (3) years of professional experience, publications, reports, patents, etc., which demonstrate outstanding contributions early in the nominee’s career.

Presentation: One award presented annually at any major NPSS sponsored conference chosen by the Awards.

Graduate Scholarship Award

Description: To recognize contributions to the fields of Nuclear and Plasma Sciences. The prize is $1,500.00, Certificate, and one-year membership paid in the NPSS. Eligibility. Any graduate student entered in a program in Nuclear and Plasma Sciences. Basis for judging: Evidence of scholarly achievement such as academic record, presentations, publications, research plans, related projects and work experience.

Participation in IEEE activities through presentations, publications, student chapter involvement, etc., will also be considered for eligibility. Up to four (4) awards presented annually. Check and Certificates sent to nominator to be presented at a special occasion at the winner's institution.

Charles K. Birdsall Award for Contributions to Computational Nuclear and Plasma Sciences

Description: For outstanding contributions in computational nuclear and plasma science, with preference given to areas within the broad scope of plasma physics encompassing the interaction of charged particles and electromagnetic fields. The award is funded by the IEEE Foundation through a gift from Ginger Birdsell and the Nuclear and Plasma Sciences Society. The prize is $20,000 and a Plaque. All members in good standing of the IEEE are eligible. Judgment is based on outstanding contributions to computational nuclear and plasma science, with preference given to areas within the broad scope of plasma physics encompassing the interaction of charged particles and electromagnetic fields. Presentation: At an IEEE NPSS conference specified by the recipient.

Ronald J. Jaszczak Graduate Award

Description: Recognizes and enables an outstanding graduate student enrolled in an accredited Ph.D. curriculum. Post-doctoral fellow or Ph.D. level Research Associate in the field of nuclear and medical imaging sciences to advance high/low research activities. The award is funded by the IEEE Foundation through a gift from Ronald Jaszczak and the Nuclear and Plasma Sciences Society. Through 2018 the prize supports one individual for expenses up to $5000.00 maximum per year for three years. At the time of the initial award period, a plaque is presented designating the individual as the recipient of the IEEE Ronald J. Jaszczak Award. See www.ieee.org/npss/npsa/awards/grad/ for more information. In 2019 this becomes an annual award.

Glenn F. Knoll Postdoctoral Educational Grant

Description: For outstanding postdoctoral researchers in the field of nuclear science instrumentation, medical instrumentation, or instrumentation for security applications. The grant is intended to support travel and attendance at conferences, workshops or summer schools, or special research projects. The award is funded by the IEEE Foundation through gifts from Gladys H. Knoll and Valentin T. Jordanove and funds provided by the IEEE Nuclear and Plasma Sciences Society, Prize: $5,000 and Plaque. Eligibility. Post-doctoral researcher who is a member of the IEEE Nuclear and Plasma Sciences Society, Prize: $5,000 and Plaque. Eligible candidates must be in mid-level to senior phases of their careers who are members of the IEEE Nuclear and Plasma Sciences Society and whose prior technical accomplishments and potential earmark them as current and future leaders in the field of nuclear and plasma science and as role models for future generations of women in the field. Nominees shall have a minimum of five years of experience as an IEEE NPSS member and shall have been a major contributor to ELDRS characterization and modeling. More information about the award can be found at http://ieee-npss.org/awards/Technical-Committee-Award/. The 2018 winners are recognized in the 2019 NPSS News.

NPSS Women in Engineering Leadership Development Travel Grant

Description: To provide leadership-edge professional development for women who are in mid-level to senior phases of their careers. One awards per year will receive a grant to the candidate and be reimbursed for expenses associated with traveling to and participating in the IEEE Women in Engineering International Leadership Conference (WEILC) up to a maximum of $3,000. Eligible nominees must be women who are in mid-level to senior phases of their careers who are members of the IEEE Nuclear and Plasma Sciences Society and whose prior technical accomplishments and potential earmark them as current and future leaders in the field of nuclear and plasma sciences and as role models for future generations of women in the field. Nominees shall be female IEEE members who have at least 10 years of experience in the nuclear and plasma sciences field after obtaining the highest degree (Bachelor, Master, Ph.D.). Nominees must be able to attend the WEILC in the year of the travel grant call. Preference shall be given to applicants who are also members of the IEEE Women in Engineering. Judging: Based on leadership roles and leadership, technical, leadership, travel grants, and mentoring and outreach activities in areas related to recruitment and retention of women in STEM careers. Presentation: Presented at the IEEE Nuclear and Plasma Sciences sponsored conference chosen by the awarder.

Phelps Grants

Additionaly, NPSS funds a special category award—a Phelps Grant—given to encourage Short Course attendance. These are: Paul Phelps Continuing Education Grant: 1) continuing education and encourage membership in NPSS. Prize: Maximum of $8,000/year for all recipients, generally for tuition in NPSS Sponsored Short Courses, but other cases, also for partial travel expenses to NPSS Short Courses. Eligibility: Outstanding Student Members of NPSS and unemployed Members of NPSS who need assistance in changing career direction. Basis for judging: Exceptional promise as a Graduate Student in any of the fields of the NPSS, exceptionally good work in those fields for currently unemployed NPSS members and an expectation that attendance to one or more of the Short Courses will result in improved possibility of obtaining a job in the NPSS fields.

Presentation: Presented each year at the NPSS-sponsored conferences in which the Short Courses are held. The awards will be handled prior to the dates of the Conferences, so that award recipients can apply the corresponding funds towards tution and/or traveling costs to the Short Courses. Those interested in applying for a Phelps Grant should contact the Technical Committee chair hosting the conference with a Short Course.

I strongly encourage you to please look at the website for nomination information and take the time to identify one of the future leaders in pulsed power science and technology.

Ronald L. Pease 2017 Radiation Effects Award Recipient

Ronald L. Pease is the recipient of the 2017 IEEE/ NCSA Radiation Effects Award. Ron received a B. S. in Physics from Indiana University in 1965, and did graduate work at the University of Washington. He started his career at NASA/Crane in 1966, working on radiation effects in bipolar diodes. He continued working on radiation effects at IBM (Albuquerque), Mission Research Corporation, and RPL Research until his retirement in 2015. Ron has had a long history of important technical contributions to radiation effects research and to the survivability of critical defense and space systems. This includes testing, analysis, and modeling of dose rate, total dose, displacement damage, and single-event effects in semiconductor devices and circuits. He is widely recognized as a leader in understanding radiation effects on bipolar transistors and bipolar linear circuits, and has published more than 100 peer-reviewed papers on radiation effects. He was one of the discoverers of Enhanced Low Dose Rate Sensitivity (ELDRS) in bipolar technologies, and has been a major contributor to ELDRS characterization and modeling. The original paper on that topic, published in 1991, has been cited 21 times in the published literature. Ron was elevated to IEEE Fellow in 2007.

Ron has been an active participant in the IEEE Nuclear and Plasma Sciences Society (NPSS) for more than 40 years, and has served on committees for several conferences, including Technical Program Chair in 1991, and General Conference Chair in 2000. He was the author or coauthor of four papers that received the Outstanding Paper Award. He has given two short courses at the NPSSC and invited papers and short courses at the European RADCETS Conference. He has also been active in the HEART Conference, and received the Peter Haas Award from that conference in 2002.

The Radiation Effects Award was established by the Radiation Effects Committee in 1988 to recognize individuals with a sustained history of outstanding and innovative technical and/or leadership contributions to the radiation effects community. The award to Ron Pease was presented on July 18th at the 2017 Nuclear and Space Radiation Effects Conference.

Citation: For contributions to testing, analysis, and modeling of radiation effects on semiconductor devices and circuits and to the understanding of the underlying physics and engineering.

Teresa Fanas, Radiation Effects Vice Chair for Publicity, can be reached by E-Mail at Teresa.Fanas@ashburn.com.
IEEE FELLOW NOMINATIONS DUE MARCH 1

To be considered, a nominee must meet the following three basic qualifications:

- Significant accomplishments that have contributed importantly to the advancement of engineering, science and technology to society;
- Significant contributions as Application Engineer / Practitioner, Educator, Research Engineer/Scientist, or Technical Leader;
- Evidence of technical accomplishments;
- Evaluation by the IEEE Society / Technical Council selected by the nominator;
- Confidential opinions of references and endorsers;
- Service to other professional engineering societies;
- Total number of years in the profession.

According to IEEE bylaw 3-0.5.S, the total number of Fellow recommendations in any one-year must not exceed one third of one percent of the voting membership on record as of 31 December of the year preceding the IEEE Board of Directors make the final selection at their November meeting.

On behalf of the NPSS Fellow Evaluation Committee, I urge you to nominate a deserving colleague for IEEE Fellow—a noteworthy milestone in anyone’s career. It is an extremely competitive process—and it is always challenging to review these nominations—but I hope you can make the job of the NPSS Fellow Evaluation Committee even more difficult by increasing the number on nominations in 2018.

PUBLICATIONS

IEEE Transactions on Plasma Science

Upcoming Special Issues through June 2018

- December 2017 — Plasma-Assisted Technologies — Senior Editor: Steven Gitterman (Los Alamos National Laboratory (ret), Los Alamos NM USA); Guest Editors: Igor Matveev (Applied Plasma Technologies, Falls Church VA USA) & Tim Abbemel (AFR Force Research Laboratory, Wright Patterson AFB OH USA).
- January 2018 — Selected Papers from International Workshop on Microplasmas and Cubalets — Senior Editor: Steven Gitterman (Los Alamos National Laboratory (ret), Los Alamos NM USA); Guest Editors: Shuyan Xu (Nanyang Technological University, Singapore), Michael Keidar (George Washington University, Washington, DC USA); Francesco Tzicogno (CNR-Nanotec –Plasmati Lab. /Pad |Par-Based Plasma Model (FPPM) Group, Bari, Italy), Ilgor Levenichko (Nanyang Technological University, Singapore and Queensland University of Technology, Brisbane, Australia).
- March 2018 — Selected Papers from Latin American Workshop on Plasma Physics — 2017 — Senior Editor: Steven Gitterman (Los Alamos National Laboratory (ret), Los Alamos NM USA); Guest Editors: John Shabot (Seton Hall University, South Orange, NJ, USA), WeiDong Zhu (Saint Peter’s University, Jersey City, NJ, USA) & Anil Daugia (Naval Research Laboratory, Washington, DC, USA)APRIL 2018
- April 2018 — Selected Papers from SOFE 17 — Acting Senior Editor: Elizabeth Suranyi (Technology, US Army, Colorado Springs CO USA); Guest Editors: Peter Hartman (Research Institute for Solid State Physics and Optics, Budapest, Hungary) and Aija Pauks (Charles University, Prague, Czech Republic).
- May 2018 — 2 Plasmar 2018 — Senior Editor: David E. O’Rourke (USD R&D, San Diego, CA USA); Guest Editors: Ali Satarow (University of Nevada, Reno, NV, USA) & John Gulkani (Naval Research Laboratory, Washington, DC USA).
- June 2018 — High Power Microwave Generation — Senior Editor: Don Nefkens (AFR Force Research Laboratory, Kirkland, WA, USA); Guest Editors: Brooke Stutzman (U.S. Coast Guard Academy, New London, CT, USA), Jim Browne (Bowie State University, Bowie, MD, USA) & Julie Laurence (AFR Force Research Laboratory, Kirkland, WA, USA), Working in He (University of Strathclyde, Glasgow, UK).

Some tool
I confess to being an optimist about things, especially about somebody being able to understand how things are put together. So many young people are forced to specialize in one line or another that a young person can’t afford to try to cover the waterfront—only an old fogey who can afford to make a fool of himself: I don’t want, who will?

John A. Wheeler

OK BY ME!
There are no interruptions scheduled at this time. We apologize for any inconvenience this may cause.

Vancouver Public Library web site

Better is the Tough Part

Originality consists not only in doing things differently, but also in ‘doing things better’.

YOU FIRST
The early bird may get the worm but the second mouse gets the cheese.

Not All the Time
The value of marriage is not that adults produce children, but that children produce adults.

Strong, Silent Type
He hasn’t got much to say, but at least he doesn’t try to say anything else.

Robert Benchley
**A 3.9 ps RMS Resolution Time-to-Digital Converter Using Dual-sampling Method on a Kintex UltraScale FPGA**

**REFERENCES**

Fast Integral Solver in Computational Plasma

Every time when we talk about computational plasma physics we are talking about different kinds of mathematical models which will describe or approximately describe different aspects of plasma physics and different kinds of numerical methods and algorithms which have been applied to solve the mathematical models. With the accelerating development of computational equipment, more sophisticated plasma physics phenomena have been explained by numerical methods, revealing previously unknown plasma physics phenomena. However, due to the extreme complexity of plasma physics, developing faster and more accurate numerical methods and algorithms is the unrelenting pursuit for computational plasma scientists.

The integral equation method, one of the most popular numerical methods, is involved in several computational plasma models, such as electrostatic potential and electric field evaluation in kinetic models, ideal magnetohydrodynamics, and so on. My research is focusing on the acceleration of integral equation method. For a given integral operator,

\[ \phi(x) = \int G(x,y) \rho(y) \, dy \]

with proper basis functions representing the unknowns, and applying the Galerkin method with proper testing functions, we can transfer the integral equation into matrix form:

\[ [A]_{N \times N} [\phi]_N = [b]_N \]

Due to the nature property of the kernel functions \( G(x,y) \) for most integral equation models, the integral operator matrix is \( (A) \) a full matrix. Obviously, when we apply the matrix-vector multiplication of \( [A]_N \), \( [\phi]_N \), the computational complexity is in the order of \( O(N^2) \). To accelerate this calculation, we have studied several approaches.

Let’s consider a group of basis functions and a group of testing functions, whose physical interactions are represented as a sub-block \( (a_{ij})_{m \times m} \) in matrix \( (A) \). When the two groups, the group of basis functions and the group of testing functions, are near to each other, the physical interactions between any pair of testing and basis functions will be sensitive to each other; on the contrary, when they are far apart, the physical interactions between any pair of testing and basis functions will be similar. In other words, the corresponding sub-block of the matrix, which represents the far-apart group, can be re-described with fewer parameters. This kind of matrix is considered to be a low-rank matrix, and the sub-blocks which represents near field interactions are full-rank matrices. For instance, if an \( m \times m \) sub-block \( (a) \) is low-rank, it can be represented as:

\[ [a]_{m \times m} = [u]_{m \times r} [v]^T_{r \times m} + [e]_{m \times m} \]

where, \( [e]_{m \times m} \) is the error matrix and \( r \) is called rank of matrix \( (a) \). To take advantage of the low-rank property of the sub-blocks, the well-established singular value decomposition (SVD) method can be used to derive a compressed form of the MoM matrices. However, SVD method is computationally expensive. There are several methods that can be applied to compress a low-rank matrix. One of the most popular methods, adaptive cross-approximation (ACA), which requires partial knowledge of the matrix \((A)\) to find its approximated compressed form. The entire process requires \( O(m^2 \log m) \) operations to obtain the compressed matrix with a memory requirement of \( O(m^2) \), and once the approximation is generated, \( O(m) \) operations are needed to calculate each matrix-vector multiplication \((A)\).

Another recently developed method, dedicatedly, randomized algorithm \([D]_{tol} \) for the approximation of low-rank matrices has two variations: first, compress a matrix by the randomized algorithm called interpolative decomposition (ID); second, use the ID to obtain a much more efficient SVD for the approximation of low-rank matrices.

Where, \( \mathbf{D} \) is the error matrix and \( \mathbf{L} \) is the left singular value decomposition (SVD) matrix of \( \mathbf{M} \). To take advantage of the low-rank property of the sub-blocks, the well-established singular value decomposition (SVD) method can be used to derive a compressed form of the MoM matrices. However, SVD method is computationally expensive. There are several methods that can be applied to compress a low-rank matrix. One of the most popular methods, adaptive cross-approximation (ACA), which requires partial knowledge of the matrix \((A)\) to find its approximated compressed form. The entire process requires \( O(m^2 \log m) \) operations to obtain the compressed matrix with a memory requirement of \( O(m^2) \), and once the approximation is generated, \( O(m) \) operations are needed to calculate each matrix-vector multiplication \((A)\).

Another method to speed up the matrix-vector multiplication is fast multipole method, which is one of the most popular methods used in solving various IE problems. The key of FMA is replacing the far-apart interactions by clusters interactions, which can be evaluated by applying corresponding addition theorem of the most popular methods used in solving various IE problems. The key of FMA is replacing the far-apart interactions by clusters interactions, which can be evaluated by applying corresponding addition theorem of the most popular methods used in solving various IE problems.

REFERENCES


Dedicated to those displaced by conflicts and war.
I am so thirsty.
I have been thirsty for too long, roaming in the desert of life.

An oblivious desert,
rendered featureless by the wrath of man.
Without a home I found myself adrift,
rendered featureless by the wrath of man.

So I need to keep moving;
to quench my thirst.
I need a long cold drink
while being stalked by fear like a prey.
Doubt has been my companion
devoid of absolutes;
devoid of directions;
devoid of purpose;
devoid of any kind.

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