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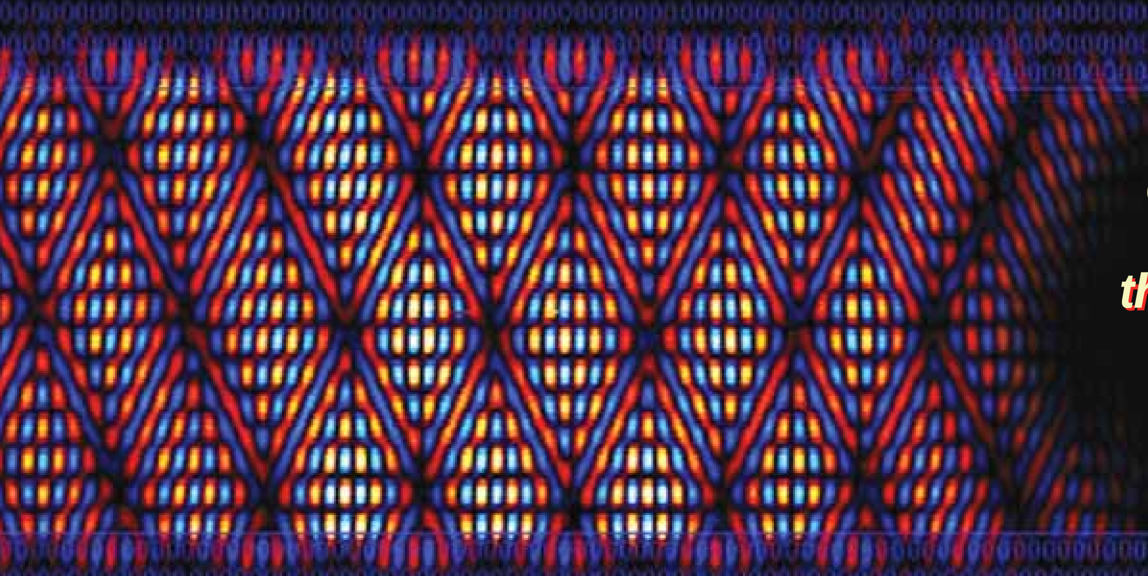
IEEE LEOS NEWS

THE SOCIETY FOR PHOTONICS

Photonic CAD Matures



Celebrating 25 Years of the IEEE/OSA Journal of Lightwave Technology

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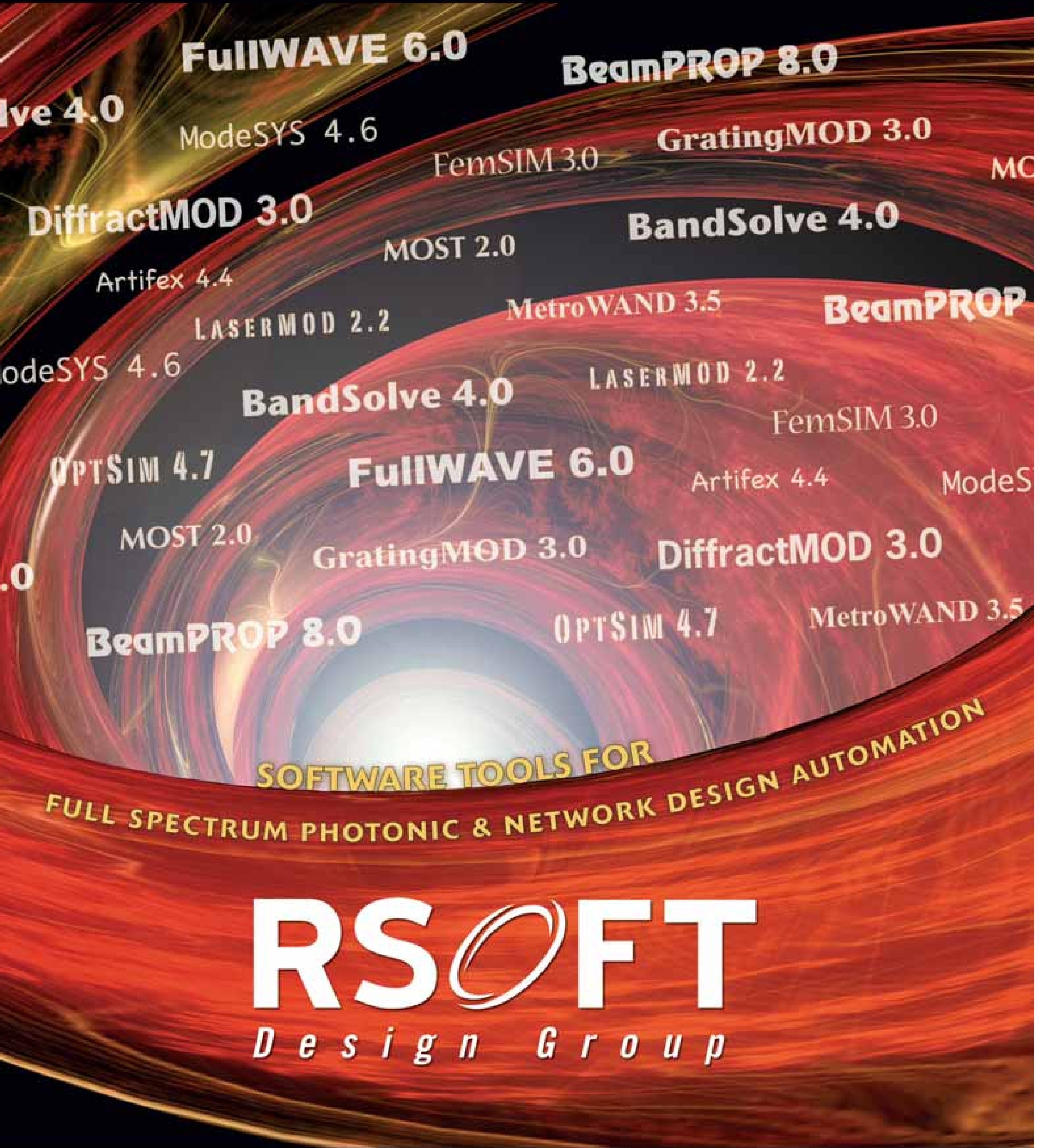
FullWAVE 6.0
BeamPROP 8.0
ModeSYS 4.6
GratingMOD 3.0
FemSIM 3.0
DiffractMOD 3.0
BandSolve 4.0
MOST 2.0
Artifex 4.4
MetroWAND 3.5
LASERMOD 2.2
OPTSIM 4.7
SOFTWARE TOOLS FOR
FULL SPECTRUM PHOTONIC & NETWORK DESIGN AUTOMATION
RSOFT
Design Group

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A photonic crystals laser oscillating in a "Littrow" mode; simulated using CrystalWave's active FDTD algorithm which couples the light to the electron population of the laser's active region.

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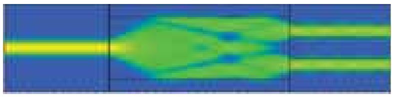
FEATURES



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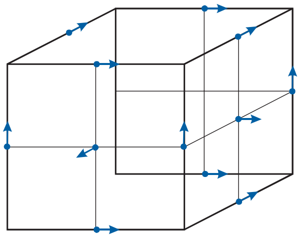

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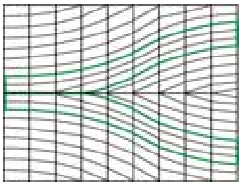

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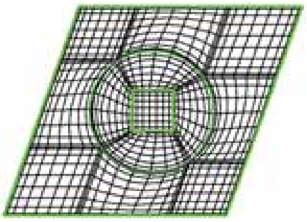

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DEPARTMENTS

COLUMNS

Editor's Column

KRISHNAN PARAMESWARAN

Welcome to the first LEOS Newsletter of 2008! The start of a new year often brings exciting changes, and this year is no exception. Firstly, LEOS welcomes Dr. John Marsh as new LEOS President. Dr. Marsh has a unique background of experience in academia and industry, and will certainly bring new ideas to help LEOS grow. Next, as Prof. Amr Helmy becomes LEOS Vice-President for Membership this year, we welcome Prof. Lawrence Chen of McGill University as the new Associate Editor for Canada. Prof. Chen has been active in LEOS activities for years, and is a welcome addition to the Editors team, joining Prof. Kevin Williams of the Technical University Eindhoven and Prof. Hon Tsang of the Chinese University of Hong Kong.

This month, we commemorate 25 years of the Journal of Lightwave Technology with a special feature article. Professors Alan Willner of the University of Southern California and Connie Chang-Hasnain of the University of California Berkeley, past and president Editors-in-Chief respectively, have written a nice retrospective on this outstanding journal. We also present a feature article by Dominic Gallagher of Photon Design Incorporated describing algorithms used in photonics modeling. Software tools are increasingly used in photonics development, and this article provides a nice overview of the techniques used in photonics design packages.

In Membership News, the Polish chapter received the award for the largest membership increase in 2007, and its activities are nicely outlined in an article by Prof. Wlodzimierz Nakwaski of the Technical University of Lódz

As always, please feel free to send any comments and suggestions to k.parameswaran@ieee.org. I would love to hear what you would like to see in the Newsletter this year. I wish everyone a happy and prosperous 2008!

Krishnan Parameswaran

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President's Column

JOHN H. MARSH

I would like to start by wishing you all a happy New Year. As I write this column, 2008 is about to begin – a new year and a new LEOS President. However, as a result of relatively recent changes to the way LEOS operates, the President is now appointed every second year; in fact I am the third President to be appointed for a two-year term. Such changes are part of the ongoing development of a vibrant society, and in 2008 the LEOS vision and strategy will be coming under detailed examination and more change is expected, with some already underway.

LEOS Vision and Strategy

Over the last two years, the Long Range Planning Committee, led by Scott Hinton, has developed a quite detailed strategy for LEOS. However, there are now only two meetings a year of the Board of Governors, and therefore of Long Range Planning, and it was clear that more time was needed for this most fundamental activity. A series of annual Strategic Planning Retreats has therefore been initiated as part of the long range planning process and these are intended to develop strategy across the Society, identifying common themes between publications, technical committees, membership, finance and conferences. The first of these one day Strategic Planning Retreats was held in August and I believe its conclusions are worth sharing.

At the August meeting it was agreed that the vision for LEOS is to be a pre-eminent global photonics society. Above all, it was recognized that LEOS is a community – a vital, active, international community of photonics engineers and scientists. A successful LEOS will have a visible and measurable effect on their careers and endeavors and individuals will recognize that there are significant benefits from being a LEOS member.

There are three ways LEOS involves and builds this community:

- Firstly, LEOS is a forum, where critical and fundamental advances in the field are shared and nurtured. The LEOS forum takes many forms, the more obvious being conferences and publications. The less obvious are no less important and include Chapters, careers meetings, tutorials, short courses, this Newsletter, and the web portal. Involvement comes from reading, referencing, and writing articles for journals, attending meetings of all types, serving as committee members, editors or referees, but also through informal interactions – ranging from offering career or technical advice and mentoring to building inter-institution and international projects. I have found these informal interactions are usually initiated at face to face meetings, such as conferences, workshops or chapter meetings, and are of immense value.

- Secondly, LEOS activities are perceived to be of high quality. Engineers everywhere around the world choose to attend LEOS conferences and publish in our journals because of their high quality, visibility, prestige, and peer perception. This high quality does not come easily – it is the result of hard and focused work by all of the LEOS community and depends as much on individuals submitting their best work to LEOS conferences and journals as on the willingness of volunteers to serve the Society in formal positions.

- Thirdly, LEOS has to be an influential advocate of photonics by articulating its value and contributions to the technical community and the general public. As photonics becomes more pervasive in all kinds of applications and products, one of the most immediate ways in which LEOS can promote photonics is by working with other IEEE societies. LEOS already

(continued on page 15)

Special Feature

"Celebrating 25 Years of the IEEE/OSA Journal of Lightwave Technology"

Alan Willner (USC) and Connie Chang-Hasnain (UC Berkeley)

"If you want to be incrementally better: Be competitive. If you want to be exponentially better: Be cooperative." Anon.

As of the December 2007 publication issue, the IEEE/OSA Journal of Lightwave Technology celebrated its 25th anniversary. We, as a past and present Editor-in-Chief, heartily congratulate all of JLT's authors, readers, editors, and reviewers on this milestone achievement!!

The journal has thrived over the past 25 years and has produced some of the most seminal contributions in lightwave technology. Many key scholarly articles can be found in individual manuscripts as well as in targeted Special Issues. Moreover, the topics treated in JLT have continually evolved over time to be at the very forefront of our field. It is not surprising that JLT is consistently ranked near the top of all electrical engineering and optics journals in terms of its impact on readership.

Dating back to 1983, JLT has enjoyed the insightful leadership of some extremely distinguished individuals, namely Tom Giallorenzi (Editor-in-Chief '83-'88), Don Keck (Editor-in-Chief '89-'94), and Rod Alferness (Editor-in-Chief '95-'00). *[Please read the inset boxes of their personal perspectives.]* We have all strived to maintain the extremely high standards of quality that are the cornerstone of our community. We have grown dramatically over the years and now publish ~5,000 pages annually. Additionally, we are highly international, with approximately 75% of the manuscript submissions and 66% of the Editors originating from countries outside the U.S.

We are a "big tent" in terms of diverse topics, constituents, and geography, and our journal occupies a unique position among the technical societies. It was recognized from the beginning that lightwave technology is a multidisciplinary field. Therefore, through the efforts of many wise individuals such as Henry Kressel, the journal was formed by a collection of seven IEEE technical societies *(AES: Aerospace and Electronic Systems, ComSoc: Communications Society, ED: Electron Devices, IM: Instrumentation and Measurements, LEOS: Laser and Electro-Optics Society, MTT: Microwave Theory and Techniques, and UFFC: Ultrasonics, Ferroelectrics, and Frequency Control)* and the *Optical Society of America (OSA)*. This cooperation/collaboration is a tremendous asset in terms of capturing emerging topics as well as directing effort wherever it brings the most value to the readers.

JLT is governed by Coordinating and Steering Committees that: (i) have representation from each of the sponsoring societies, and (ii) meet regularly to discuss strategic and budgetary matters. The committee members are leading figures that take their professional responsibility quite seriously, and the current Chair of both committees is John Lee, a master at predicting page budgets (see inset box). Primary publishing of JLT is expertly handled by the IEEE LEOS publications staff, and we extend our deepest appreciation to Douglas Hargis and Linda Matarazzo for their tireless efforts and good cheer!

In addition to the 12 regular monthly publication issues, we annually produce several special issues. These are compact archival resources of high-quality technical information on a specific subject and enable the journal to more readily expand into emerging technologies. special issues help plant us as a valuable resource in new areas as well as cement our leadership in our core strengths. It should be emphasized that the scope of JLT is quite broad, and we are uniquely situated to sponsor multi-disciplinary Special Issues that cover technologies related to any of our eight sponsoring societies. An added bonus is that we publish an annual Special Issue on the Conference on Optical Fiber Communications (OFC), which is the premier meeting in its field and is also co-sponsored by the IEEE and the OSA. In this Special Issue, Tutorial and Post-Deadline Papers are highlighted.

We want to call your attention to the upcoming Special Issue on the 25th Anniversary of JLT that will appear in mid-2008. The papers are historical perspectives concerning various technologies that have had great impact, and the list of authors is a veritable "Who's Who" from our community. Topics will include: fiber and waveguide design, LEDs and lasers, integrated optics, receivers, nonlinearities, communication systems, networks, measurements, sensors, and microwave photonics. It is quite exciting to imagine the dramatic impact of JLT that will be chronicled in the 50th Anniversary Special Issue!

If you haven't been a participant in JLT, come join us. If you have been involved, "three cheers for us!"

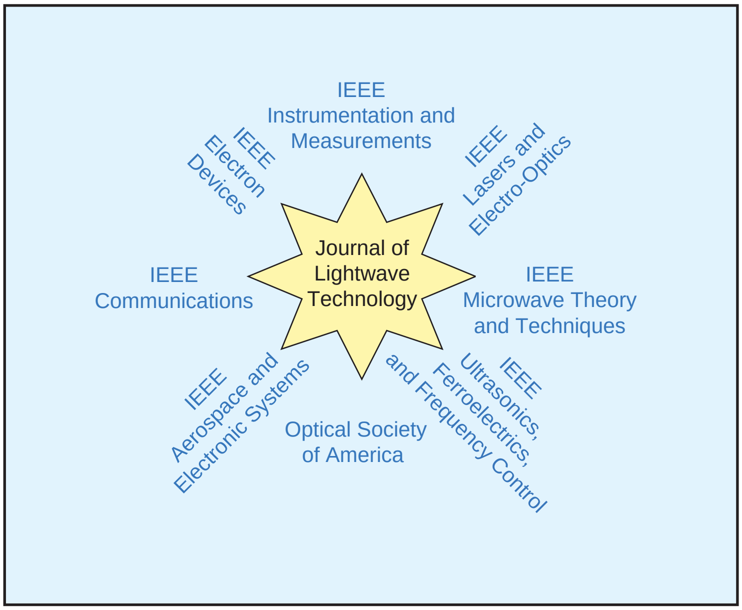
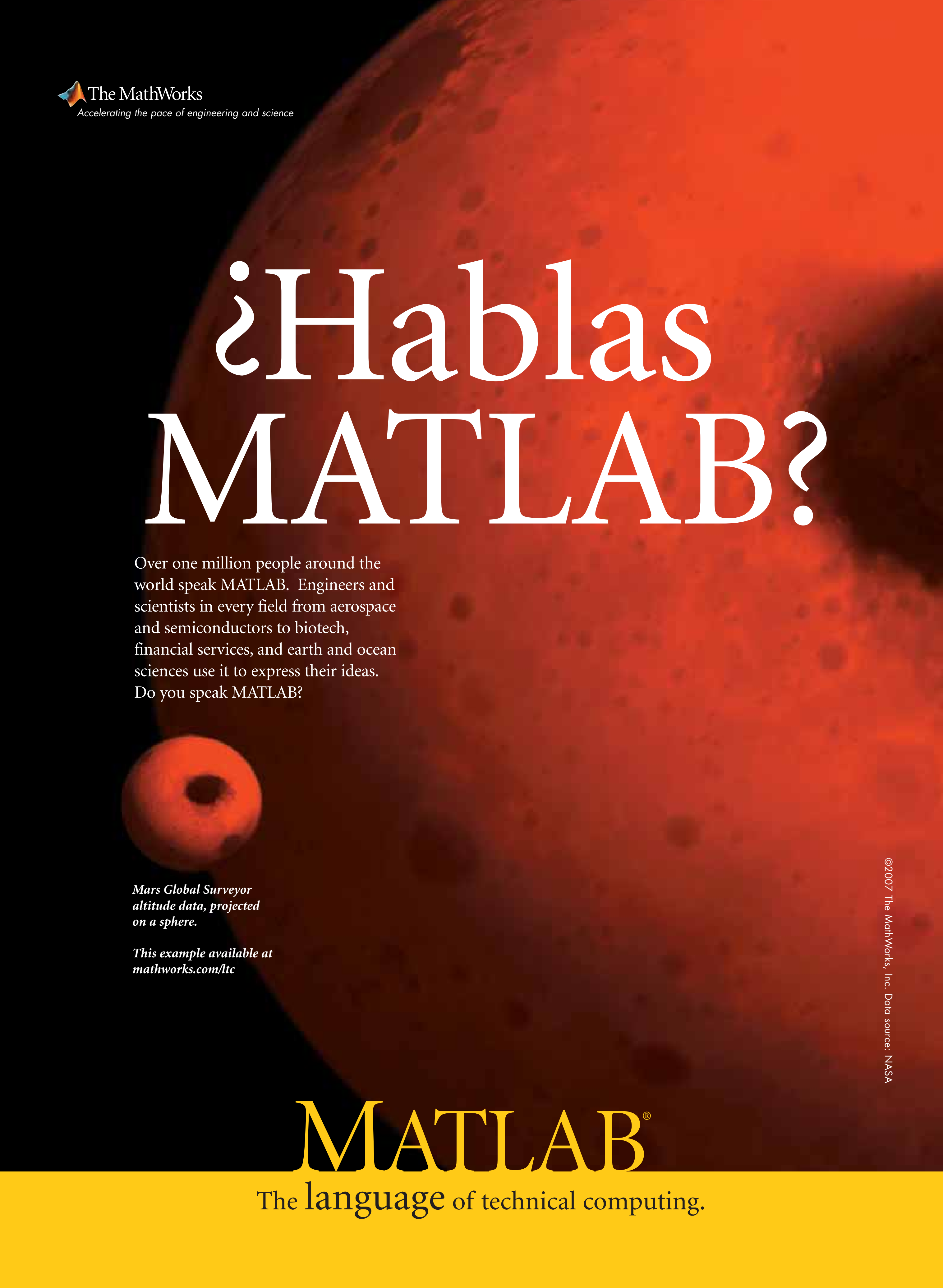


Figure 1. The sponsoring societies of the Journal of Lightwave Technology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MATLAB®
The language of technical computing.

Thomas G. Giallorenzi, Editor-in-Chief (1983-1988)

By the early '80's, it had become obvious that optical guided-wave technology was becoming firmly entrenched and that it was starting to establish itself in the commercial world. The IEEE examined whether a journal dedicated to this technology was warranted by publishing several special issues in the Journal of Quantum Electronics. The success of these special issues confirmed that the membership within multiple IEEE societies as well as the OSA could easily sustain such a journal. Since several societies came to this conclusion at the same time, instead of competing, they decided on a cooperative approach by publishing a joint journal with seven IEEE societies and the OSA as co-sponsors. The cooperative nature for sponsoring JLT fostered the sharing of critical technical data that led to rapid advances in the field. The interdisciplinary makeup of the sponsoring societies also contributed to the journal's offering a complete picture of important advances and was a unique characteristic the journal brought to scientific publishing at the time.

As it was my pleasure to serve as the first editor of JLT, I can attest to the hard work many volunteers contributed to making the Journal a success. Henry Kressel led the way in establishing the journal as well as building consensus to the concept of a cooperative journal. The JLT Steering Committee representing all the sponsoring societies proactively labored to make the journal the premier source of lightwave technology information. There are numerous associated editors and IEEE staff who also made important contributions. After 25 years of publication, all associated with JLT can be proud of these accomplishments and our contributions to spreading guided-wave knowledge.

Donald B. Keck, Editor-in-Chief (1989-1994)

It seems hard to believe that JLT has been serving our technology for a quarter century. The Journal was a wonderful creation by some far-sighted individuals. They saw the tremendous future of lightwave technology and the benefit of providing a single preeminent source of the latest peer reviewed technical information in our rapidly moving science and technology arena. More importantly, they forged a collaborative effort among the relevant professional societies. JLT provides efficiency for the readership.

During my tenure as editor, our field experienced remarkable technological advancement. One of my great delights was to see the very latest breakthroughs unfolding as the papers came across my desk from around the world. The erbium amplifier was providing the second revolution in optical fiber telecommunications. That ushered in the excitement of WDM devices and systems, and the beginning of optical networking. Several special issues were assembled to chronicle the rapid progress.

I found it most gratifying that there were noted scientists from around the globe willing to serve as Associate Editors and reviewers. Perhaps it happens in any endeavor that friendships are established. But it always seemed to me that the collegiality of our arena, being so new and vibrant, built more and stronger relationships on an international scale. The Journal was and still is an important part in making that happen - a treasure for our technology.

We should all be proud of the role we have had in creating the Information Age and a truly better world. I can't wait to read the 50th anniversary issue!

Rodney C. Alferness, Editor-in-Chief (1995-2000)

I feel extremely fortunate that the years of my tenure as editor were extremely exciting and productive times for lightwave communications and for our journal. The earlier breakthrough of the practical optical fiber amplifier had opened up the field of WDM transmission systems, and, driven by a growing demand for bandwidth, commercial systems were being deployed. Furthermore, research teams around the world leveraged this new technology to achieve single fiber transmission capacities exceeding 1 Terabit/sec over long, unregenerated distances.

The reality of optical transmission systems encouraged researchers to consider the feasibility and value proposition of wavelength-routed networks and their enabling switching elements. Given that these networks required the functionality that integrated optical (IO) circuits could provide, research on IO elements heated up as well. Moreover, the long distances enabled by amplifiers also drove research on techniques to mitigate the impact of transmission impairments.

While innovative lightwave technologies were enabling major advances in the capabilities of lightwave systems, the Internet suddenly appeared as the "killer" application that could benefit from cost-effective bandwidth reaching around the world. All these exciting research and commercial developments built on each other, resulting in great energy in the field and important papers for JLT. Through the dedicated and tireless efforts of the Associate and Guest Editors, volunteer peer reviewers, authors and JLT staff, we were able, I believe, to capture the excitement, growth and impact of lightwave technology in the journal. I am honored and thankful to have been part of this important period in the history of JLT.

John N. Lee, Chair, JLT Coordinating and Steering Committees

The business aspects and publication policies of most journals are governed by a single society. However, volunteers to JLT's multi-organization IEEE Steering and IEEE/OSA Coordinating Committees govern JLT. I am privileged to have served with these selfless volunteers for most of JLT's 25 years. JLT was established to forestall a destructive proliferation of journals that threatened fragmented publication of results in lightwave technology areas, and its governing committees have successfully established an unprecedented level of cooperation among the sponsoring societies. Over the years, JLT has also had to address: (i) emerging new lightwave emphases, (ii) changeable publication costs, and (iii) the advent of electronic publishing.

Paul Shumate, I, and many others on the Steering Committee have had the privilege of helping JLT obtain good financial footing in its early growth years. Now the challenge is to assure that the resources will be available to allow expansion. Moreover, the Coordinating Committee addresses publication policy, chooses the Editor-in-Chief / Associate Editors, and is actively involved in the technical direction.

JLT is very enthusiastic about working with journals whose mainline emphasis is not lightwave, but which have a readership with specific interests in some lightwave topics. We have been very pro-active in working with other journals to publish Joint Special Issues either under the JLT banner or under another journal's banner, to be sent to both readerships. Moreover, there has been discussion on how JLT can better serve our community by leveraging the journal with other activities. For example, Bernie Gollomp of the IEEE IMS has organized conferences and joint publications with JLT in the area of optical measurements.

As JLT looks to the future, I anticipate further growth, but also new challenges.

Industry Research Highlights

Photonic CAD Matures

Dominic Gallagher, Photon Design

Introduction

While electronics has enjoyed quite sophisticated computer based simulation and design tools for decades, only 15 years ago there were virtually no professional commercial tools for the photonics designer and most R&D laboratories were writing their own codes for each specific application. Things have moved a long way since those days and now there is a good choice of tools available to the designer. Nevertheless, in many ways photonic modelling still poses significant challenges due in part to the much larger variety of technologies employed in photonics compared to electronic circuits and there exists no photonic simulation algorithm or even commercial tool that is able to model every sort of photonic circuit. This article aims to give the reader an introduction to the main algorithms of use in photonics modelling, to highlight their strengths and weaknesses and discuss where photonics CAD is going next.

Passive Device Algorithms

This article will focus largely on the techniques for modelling passive photonic devices, where light is propagating in a medium whose refractive index is constant or is at most somewhat dependent on the intensity of the light propagating – (so called non-linear media). Active devices, where light interacts with electrons, play an important part in modern photonics in LEDs, laser diodes and the like but cannot be discussed in depth here for lack of space.

A wide variety of algorithms have been developed for the simulation of passive photonic devices, though only a few have achieved it to mainstream use. We will cover the following mainstream algorithms here in detail:

BPM - Beam Propagation Method
EME – Eigenmode Expansion Methods
FDTD – Finite Difference Time Domain

We will discuss the strengths and weaknesses of each method and give the reader some helpful information on choosing an appropriate tool for a given task.

Scoring an Algorithm

The ideal algorithm would score well in all of the following aspects:

- speed – obvious but crucial for efficient design work
- low memory usage – no point if the simulation doesn't fit in your computer
- numerical aperture – the range of angles that can be accurately propagated. Ideally the algorithm would be completely agnostic to angle.
- Δn – the refractive index contrasts in the device. Ideally the algorithm would deal well with any contrast – Si to air is ~2.5.
- polarisation – it should model all polarisations of light equally well.
- lossy materials – it should be able to model absorbing materials, even metals
- reflections – can it deal with reflections in the device?
- non-linearity – it should be able to model non-linear materials such as Kerr effect.

Table 1: Beam Propagation Method

Aspect	*Performance*	*Score/10*
Speed	FD-BPM scales linearly with area and can take fairly long steps in propagation direction	-
Memory	Usage scales linearly with c/s area	-
NA	Best with low NA simulations. Versions using Pade approximants can model a beam travelling at a large angle but still cannot deal well with light simultaneously travelling at a wide range of angles.	4
Δn	Best with low Δn simulations.	5
Polarisation	Semi-vectorial versions work best. Still problems modelling mixed or rotating polarisation structures accurately	5
Lossy materials	Can model modest losses efficiently. Most versions cannot deal well with metals	7
Reflections	Some success in implementing reflecting/bi-directional BPM but generally avoided due to low speed and stability problems	3
Non-linearity	FD-BPM can model non-linearity.	9
Dispersive	Being a frequency-domain algorithm this is easy	10
Geometries	The BPM grid allows diffuse structures to be modelled easily. Problems modelling non-rectangular structures accurately on the rectangular grid	7
ABCs	PMLs available and work well	9

- dispersive materials – it should be able to model structures where the refractive index is varying with wavelength.
- arbitrary geometries – some algorithms can model circular structures well, others rectangular. The ideal algorithm would model all geometries equally well.
- ABCs – a good algorithm should be capable of implementing an absorbing boundary condition such as the PML to absorb light hitting the boundaries of the computation domain.

We will judge our contenders against these criteria.

The Beam Propagation Method (BPM)

This is perhaps the first widely used algorithm and remains today a workhorse for the industry. There are two main variants of the algorithm, the so called FT-BPM (Fourier Transform-BPM) and the FD-BPM (Finite Difference-BPM). BPM is an axial algorithm in that it assumes that the light is travelling more or less in one direction. Newer so called wide-angle BPM algorithms significantly improve accuracy for off-axis propagation. First BPM algorithms were scalar in that they ignored the polarisation of light. These were followed by algorithms that could model TE-like and TM-like polarisations successfully and the newest algorithms have some success at modelling light of arbitrary and changing polarisation.

The key idea of BPM is to remove the fast varying term $\exp(j\hat{b}z)$ from the fields (where $\hat{\beta}$ is some characteristic propagation constant) and then to solve the now slower

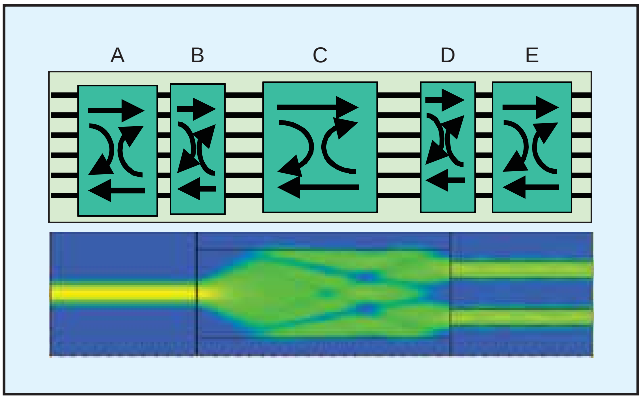


Figure 1 Modelling an MMI using EME. Within each section the fields are represented as a sum of local modes. Coupling between modes occurs only at the interfaces. The MMI can be decomposed into 5 simpler s-matrices as shown, so that even if one changes you can re-use the others, saving much time when doing a set of similar simulations.

Table 2. Eigenmode Expansion Methods

Aspect	*Performance*	*Score/10*
Speed	EME scales poorly with cross-section area – as A^3 (A is c/s area). However it can efficiently model very long structures especially if their cross-section changes only slowly or occasionally. Periodic structures scale as log(number of periods) – so can compute efficiently. S-matrix approach allows a set of similar simulations to be done very quickly – parts of previous calculation can be reused.	-
Memory	Memory increases at rate between A^2 and A^3 (A is c/s area), but very efficient for long or periodic devices.	-
NA	Can model wide-angle beams by increasing the number of modes in the basis set at expense of speed and memory.	7
Delta-n	Rigorous Maxwell Solver can accurately model high delta-n	8
Polarisation	Rigorous Maxwell Solver is polarisation agnostic	10
Lossy materials	Depends on mode solver used.	7
Reflections	Yes – easy and stable even when there are many reflecting interfaces.	10
Non-linearity	Difficult – have to iterate, and then only modest non-linearity levels will converge	3
Dispersive	Being a frequency-domain algorithm this is easy	10
Geometries	Depends on the mode solver used. Can use different structure discretisations in different cross-sections, so solver can better adapt to the geometry.	7
ABCs	Depends on the mode solver used. E.g. a finite-difference solver can be readily constructed to implement PMLs. However, PML's are more difficult to use with EME than with BPM or FDTD.	7

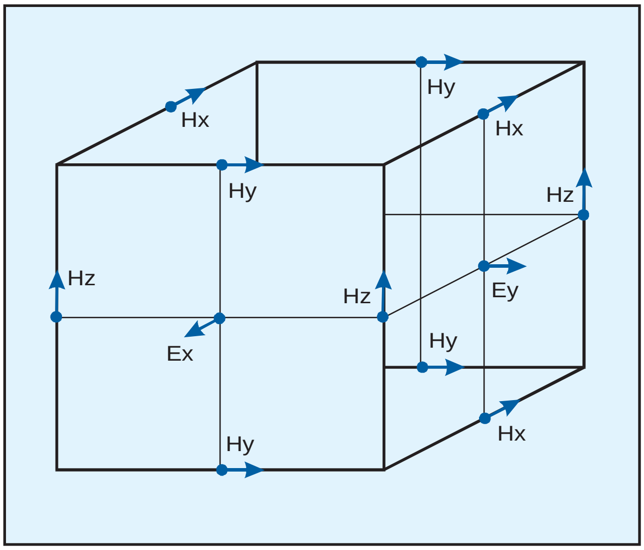


Figure 2: The Yee cell of FDTD, showing the position of the 6 EM fields on the cell surface. This staggered grid makes the algorithm more accurate.

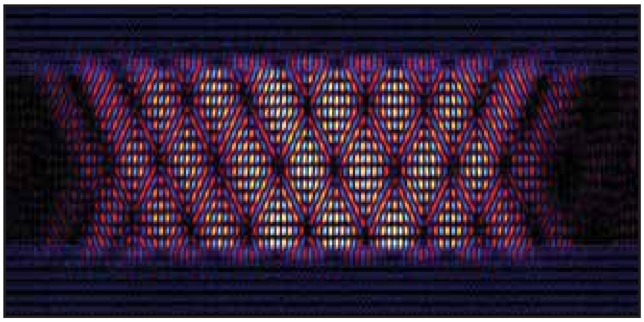


Figure 3 A photonic crystals laser oscillating in a "Littrow" mode; simulated using CrystalWave's active FDTD algorithm which couples the light to the electron population of the laser's active region.

varying fields. It works well for modelling waveguide components such as tapers and y-junctions especially with modest Δn (refractive-index contrast). It struggles to give accurate results for silicon nanowire technologies, where both Δn is high and, because of tight confinement the light is effectively travelling at a large range of angles from the device axis.

Table 1 summarises different aspects of BPM performance, with scores out of 10 for each aspect. Speed and memory performance are not given scores since these depend too much on the application – BPM might be fastest for one application and FDTD for another.

Eigenmode Expansion Methods (EME)

This term covers a variety of algorithms that decompose the electromagnetic fields in terms of a sum of local eigenmodes. Bidirectional eigenmode propagation (BEP) has been widely developed by our company into a viable alternative to the BPM algorithm and provides several advantages for certain applications. We will discuss here the BEP variant.

The principle of EME can be encapsulated in the following equation for the propagation of light in a waveguide (i.e. that is not varying in the z-direction):

$$\underline{E}(x,y,z) = \sum_m \underline{\mathsf{E}}_m(x,y)\cdot(c_m^+ .e^{i\beta_m z} + c_m^- .e^{-i\beta_m z})$$

electric field

$$\underline{H}(x,y,z) = \sum_m \underline{\mathsf{H}}_m(x,y)\cdot(c_m^+ .e^{i\beta_m z} + c_m^- .e^{-i\beta_m z})$$

magnetic field

where $\underline{\mathsf{E}}_m(x,y)$ is the electric field profile of the mth mode, β_m is its propagation constant, and c_m^+, c_m^-, are the amplitudes of the mode in the +z and –z directions respectively. Having an expansion in terms of a complete set of modes permits one to write a scattering matrix for any component in the form:

$$\begin{pmatrix} \underline{v}_{lhs} \\ \underline{v}_{rhs} \end{pmatrix} = \underline{\underline{S}} \begin{pmatrix} \underline{u}_{lhs} \\ \underline{u}_{rhs} \end{pmatrix}$$

where $\underline{u}_{lhs}$ and $\underline{v}_{lhs}$ are the vector of amplitudes of the modes entering and exiting (respectively) the left hand side. These few equations immediately illustrate some useful features of EME:

- it is fully bi-directional; in fact it can be made almost omni-directional if sufficient modes are used.
- it is a fully vectorial algorithm, making no approximations of the polarisation of the light.
- it is a rigorous solution to Maxwell's Equations; the main approximation being the finite number of modes used.
- The scattering matrix approach means that you solve the problem for all inputs simultaneously, so you can for example get the response for both TE and TM polarisations in one go. It also allows you to divide a large circuit into multiple parts and then re-use the s-matrix of the parts again potentially saving a lot of time.
- It allows efficient modelling of periodic or repeating structures since one can evaluate the s-matrix of one period and then re-use it.

Table 2 summerizes various aspects of EME methods.

The Finite-Difference Time Domain (FDTD) Algorithm

This is perhaps now the most widely used algorithm for the solution of Maxwell's Equations. It is a brute force finite-difference discretisation of Maxwell's Equations in time and space. In principle it can model virtually anything, given enough computing power. It is also very simple to implement – the basic algorithm can be written in 30 lines of code.

The dominant FDTD algorithm dates back to Kane Yee in 1966 but variants with e.g. triangular grids have appeared more recently. Table 3 summerizes FDTD aspects.

Comparing BPM, EME, FDTD

The score tables given above do not of course tell the whole story. The following "applicability diagrams" show graphically how the three algorithms fair in response to varying numerical aperture, cross-section and length.

Figure 4 shows how the FDTD, BPM and EME algorithms fare with varying Δn and device length. FDTD due to its small grid size cannot do very long things. However it can deal with high Δn structures. BPM can do much longer things but cannot deal well with high Δn structures. EME can model the longest structures such as a fibre taper efficiently and can also deal with high Δn devices accurately.

Figure 5 shows how the FDTD, BPM and EME algorithms fare with varying numerical aperture (range of angles) and cross-section size. FD-BPM can cope with the largest cross-section sizes due to its order-N algorithm, but cannot cope well with light travelling at a wide range of angles. FDTD can do omnidirectional simulations (large NA), but smaller cross-sec-

Table 3. Finite Difference Time Domain

Aspect	*Performance*	*Score/10*
Speed	Scales as V (device volume) but grid size is small so not as good as BPM or EME for long devices.	-
Memory	Scales as V (device volume) but grid size is small so not as good as BPM or EME for long devices.	-
NA	Omni-directional algorithm is agnostic to direction of light – great when light is travelling in all directions	10
Delta-n	Rigorous Maxwell solver, happy with high delta-n, but slows down somewhat with high index.	9
Polarisation	Rigorous Maxwell Solver is polarisation agnostic	10
Lossy materials	Can model even metals accurately with a fine enough grid and small modifications to the algorithm.	
Reflections	Yes – easy and stable even when there are many reflecting interfaces.	10
Non-linearity	Yes – non-linear algorithm relatively easy to do	9
Dispersive	Have to approximate the dispersion spectrum with one or more Lorentizans but exact fit to the spectrum over a wide wavelength is difficult and the algorithm also slows down.	7
Geometries	Fine rectangular grid can do arbitrary geometries easily, though there are problems approximating diagonal metal surfaces	8
ABCs	Yes – very effective and easy to use	9

tions than BPM due to its fine grid. EME can do high NA or large cross-section but not both, since high NA and large sections both require one to increase the number of modes used and this number would become impractical.

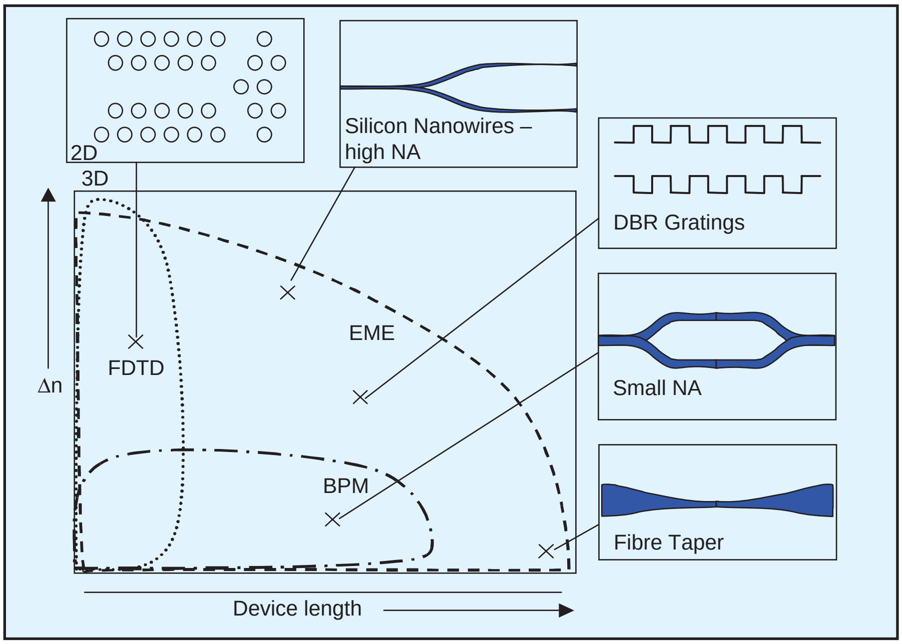


Figure 4 Showing the domains of applicability of FDTD, BPM and EME to varying Δn and device length.

Evolving BPM

Despite its age, significant advances are still being made in the BPM algorithm. For example in recent times, the efficient ADI technique has been combined with Pade approximation methods to significantly speed up the speed of computation at some expense of accuracy and even this accuracy cost has now been reduced substantially. Hadley, responsible for the original Pade modifications of BPM, has demonstrated work on slanted meshes that are able to conform to the boundaries of the structure – see Figure 6. Many other workers are still actively engaged in developing BPM further.

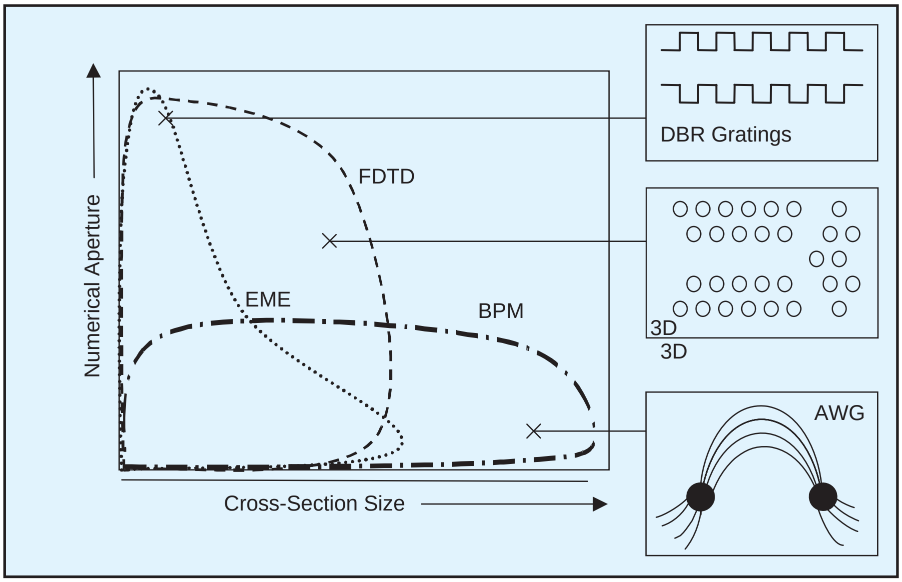


Figure 5 Showing the domains of applicability of FDTD, BPM and EME to varying numerical apperture and cross-section size.

Evolving FDTD

One of FDTD's big limitations is it's regular rectangular grid. This means that one is limited to using the same resolution everywhere, unlike a finite element algorithm which can reduce the resolution locally and also allow the grid to follow the contours of a structure. One solution to this is sub-gridding which we have implemented in our own FDTD tools – see Figure 7. The sub-gridding can be cascaded so that you could have 1/4, 1/8 or smaller local grids. For a 3D simulation, using a 1/4 subgrid over a small part of your structure can increase the speed of the simulation by up to 64 times over a uniform grid. The challenge however in sub-gridding is to prevent artificial reflections occurring at the boundaries of the sub grid and main grid. However we have recently demonstrated algorithms that exhibit reflections below 10^{-8} effectively eliminating this problem – see Figure 7.

Another promising alternative to the FDTD algorithm is the so-called pseudo-spectral time domain method (PSTD). The structure is broken down into sub-domains of uniform index so that the domains follow the boundaries of the device as shown in Figure 8. Within each domain the fields are represented by expanding in an appropriate basis set ϕ_n, typically Chebyschev polynomials

$$u(x) = \sum_{n=0}^{N} c_n \phi_n$$

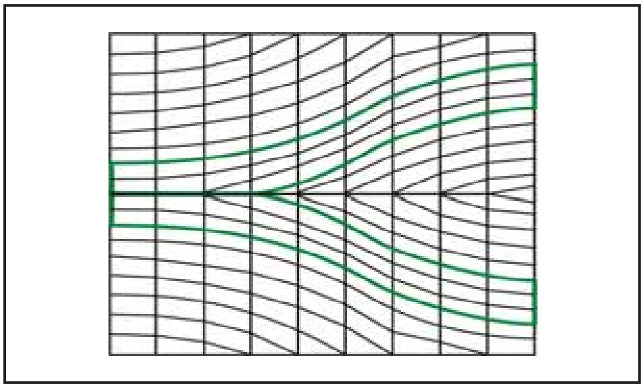


Figure 6 Improved meshes for BPM. A mesh (black) able to conform to the structure (green) substantially improves accuracy.

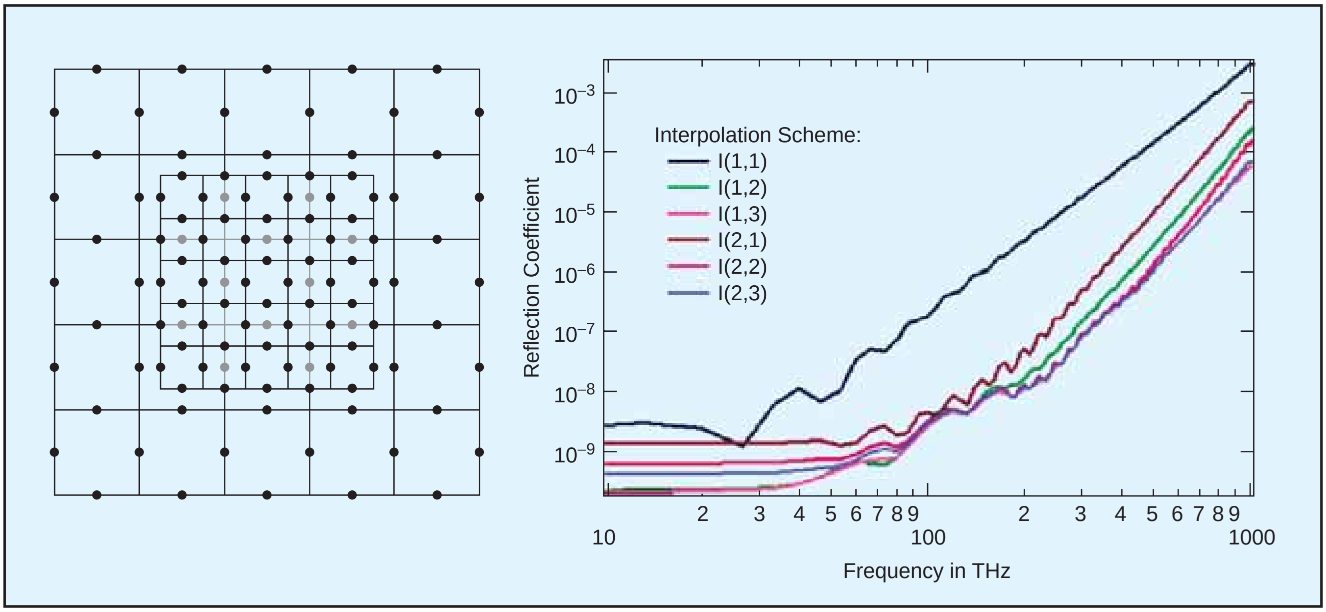


Figure 7 (left) scheme for sub-gridding FDTD, allowing additional resolution where needed; (right) different interpolating schemes for stitching sub-grids to main grid.

The method allows a varying grid size and conformation to curved surfaces and is ideal for circular or spherical metal objects where FDTD struggles.

Photonic ICs – the next stage

EME and associated scattering-matrix algorithms are ideal for the next level in photonics CAD – modelling not just individual components but whole circuits of components. Once a scattering matrix for a linear component has been evaluated then any signal can be propagated through the device. However active components can not be easily modelled using frequency domain algorithms and a circuit including active elements must be simulated in the time domain. A powerful technique for doing this is the so called time domain travelling wave (TDTW) algorithm, which we have pioneered over a number of years and have now developed into a flexible photonic circuit simulator .

The basis of the algorithm is beautifully simple. We assume that light is travelling forward or backward along a waveguide. We then remove the fast changing part $e^{i(\beta z-\omega t)}$ to leave forward A(z) and backward B(z) fields that vary slowly in both time and space. We can then write the advection equations for these fields as follows:

$$\frac{1}{v_g}\frac{\partial A}{\partial t}+\frac{\partial A}{\partial z}=j.\kappa.B+(g-j.\delta)A+F_A(N_e)$$

$$\frac{1}{v_g}\frac{\partial B}{\partial t}-\frac{\partial B}{\partial z}=j.\kappa.A+(g-j.\delta)B+F_B(N_e)$$

grating feedback — gain — detuning

This can be solved in the time domain rather like FDTD but now with much larger time and space steps because we have removed the fast varying parts. The cost is of course that it can only model fields propagating in +z or –z directions. However just like FDTD it can propagate many wavelengths at a time. Noise sources such as from spontaneous emission can be readily supported and propagated through the circuit by setting the forcing terms F in the previous equation.

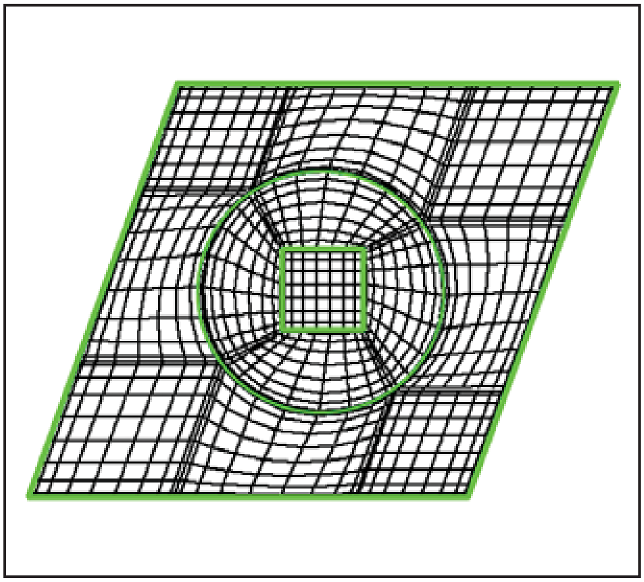


Figure 8 Discretisation of a square in a circular in a rhombus for the Chebyshev method. The grid follows the structure, giving better performance.

We illustrate the flexibility of the approach by the simulation of an all-optical 2R regenerator . The circuit is shown schematically in Figure 9. It consists of a Mach-Zehnder interferometer with an SOA in each arm. Blue rectangles are waveguides and green rectangles are power splitters/combiners. Figure 10 shows the input to the regenerator – with a slow rise time, on/off ratio of just 5 and amplitude of 1mW. On the right is the regenerated signal, with >20mW signal, on/off ratio of >30:1 and improved timing. The increased noise is

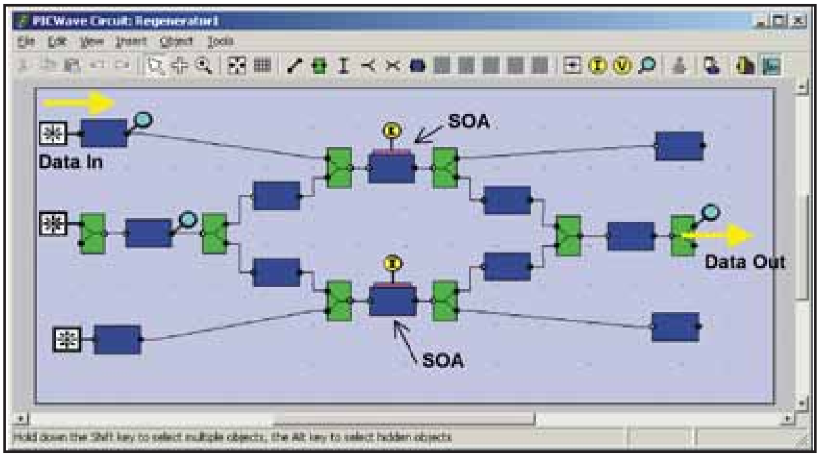


Figure 10: a 2R optical regenerator, consisting of a Mach-Zehnder interferometer with an SOA in each arm.

References

[1] Chung, Y. and N. Dagli (1990). "Explicit finite difference beam propagation method: application to semiconductor rib waveguide Y-junction analysis." EL 26: 711-713.

[2] Sztefka, G. and H. P. Nolting (1993). "Bidirectional eigenmode propagation for large refractive index steps." PTL 5: 554-557.

[3] http://www.photond.com/products/fimmprop.htm

[4] See A.Tavlov and S. Hagness "Computational Electrodynamics: the Finite Difference Time Domain Method" for an excellent review.

[5] Bekker, E., Vukovic, A. et al, 2007. "Wide-Angle Alternating-Direction Implicit Finite Difference BPM" Proc. 9th International Conference of Transparent Optical Networks, (ICTON). Rome, Italy. Vol. 1. pp. 250 – 253.

[6] Hadley G.R, "Slanted-Wall Beam Propagation", JLT, vol. 25, Issue 9, pp. 2367-2375, 2007.

[7] http://www.photond.com/products/omnisim.htm

[8] W. Pernice, "Pseudo-spectral time-domain simulation of metallic structures", Proc. OWTNM, Copenhagen, 2007.

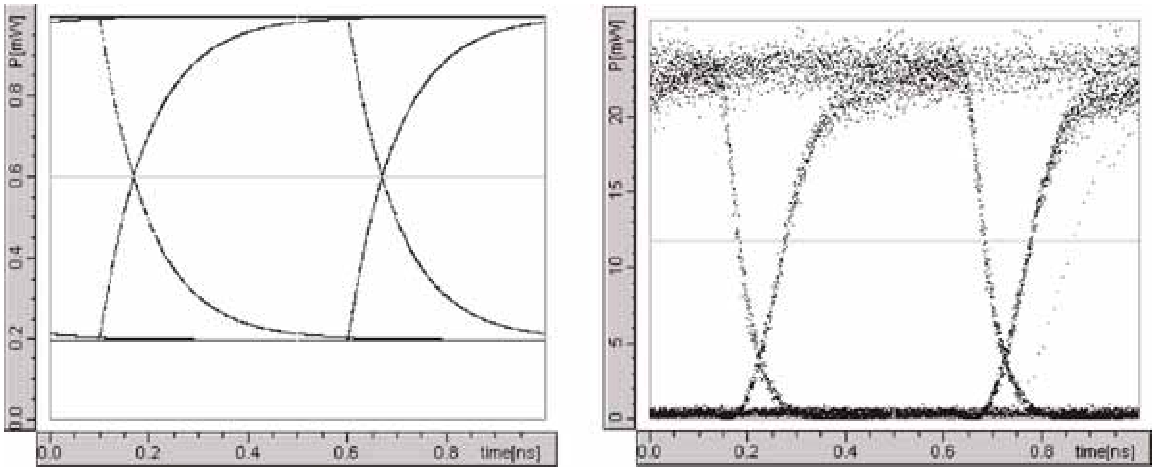


Figure 11 showing input (left) and output (right) from the 2R regenerator.

due to the spontaneous emission in the SOAs illustrating the power of the algorithm to realistically model real devices.

Where to next?

The perfect algorithm has yet to be written. In fact it never will – there will always be one algorithm better for one application and another for a different one. Thus we are likely to see increasing development of multi-algorithm simulation tools that use different algorithms for different parts of a simulation, perhaps even automatically.

Will photonics ever see the existence of tools equivalent to those in electronics that can accurately and readily model millions of transistors? Probably not – photonics uses a much more diverse range of technologies than electronics and the market is much smaller, but certainly we are likely to see some great improvements in the usability, speed and accuracy of photonics CAD in the next few years, as the photonics IC becomes established.

[9] http://www.photond.com/products/picwave.htm

[10] G. Maxwell et al, "Very low coupling loss, hybrid-integrated all-optical regenerator with passive assembly", paper PD3.5, ECOC 2002, Copenhagen (2002).

Biography:

Dominic Gallagher was born in Wales in 1962 and received a BA degree in physics from the University of Cambridge in 1984. In 1987 he obtained a PhD also from the University of Cambridge, for a thesis in optoelectronics. The next two years he was a Research Fellow at Cambridge, working on optical logic designs. In 1989 he moved to Germany to work for the Fraunhofer IAF in Freiburg, providing design support for a project to develop high speed laser diodes and another on inter sub-band photodetectors employing novel grating techniques. In 1992 he returned to the UK to start up Photon Design which he has grown into a major international player in the photonics CAD tools market in the intervening years.

(continued from page 3)

works extensively with several societies and is a member of the Nanotechnology Council and of the newly formed Biometrics Council. It also works closely with Societies outside IEEE such as OSA but there is opportunity for it to become more visible as a source of informed advice to Government and public bodies around the world.

LEOS Membership Organization

There has been one immediate change resulting from the Strategy Planning Retreat. Given LEOS is first and foremost a community, it was felt that the Membership structure should be reformed. LEOS has had three Vice Presidents for Membership and Regional Activities covering the Americas; Asia and Pacific Rim; and Europe, Middle East and Africa. This structure has served LEOS well, particularly in building a presence in new countries and forming Chapters. It has been less good at identifying and building member benefits across the Society. A new structure has been put in place, starting from January 2008, with a single Vice President for Membership and Regional Activities supported by three Associate Vice Presidents for Regional Activities covering the same geographic areas as before. The web portal and Newsletter are the primary media for communicating with members and these have been moved from being the responsibility of Publications to the new Membership VP.

This change was made with the strong support of the three existing Membership Vice-Presidents and supported unanimously by the BoG. I am delighted to report the new membership team will be

Vice President - Membership and Regional Activities

- Amr Helmy, University of Toronto

Associate VPs for Regional Activities

- Selim Unlu, Boston University (Americas)
- Roel Baets, Gent University (Europe, Mid-East, Africa)
- Jagadish Chennupati, Australian National Univ., (Asia and Pacific)

Both Selim and Jagadish are continuing for a third year, having previously served as Vice Presidents in the old membership structure.

In addition the BoG gave its strong support to the formation of a GOLD committee under the leadership of Lianshan Yan who already represents GOLD on the BoG.

Building the LEOS Community – a Plea for Help

I would finally like to renew a request made by Phil Anthony when he was President in 2001. Although the organizational structure of LEOS is important to the working of the Society, its members are its community. The best recommendation in recruiting new members is a personal one, and I would like to invite you recruit one new member each in 2008. When Phil made this request in 2001, the photonics industry was close to meltdown, but LEOS membership still grew by 20%. If we can focus again on membership growth in 2008, against the background of a robust and growing international photonics industry, it should be possible to exceed the 2001 growth rate by a large margin. As I hope I have illustrated above, the LEOS community is built from small as well as large personal contributions – and by recruiting only one member each the impact of the LEOS community will be enormous.

News

2008 IEEE LEOS Fellows

Congratulations!

Please join us in congratulating the 24 LEOS members who became IEEE Fellows this year. It's a significant honor that is based on major technical contributions, leadership, and service to the Institute and the profession.

The deadline for Fellow nominations is March 15. For more information, and to learn how to submit a nomination, check out the Fellows page on the IEEE Web Portal at: www.ieee.org/about/awards/fellows/fellows.html

IEEE SOCIETY REPORT - IEEE FELLOWS ELEVATED AS OF JANUARY 2008

Jinyun Zhang
Mitsubishi Electric Research Labs, Cambridge MA, USA
For contributions to broadband wireless transmission and networking technology

Kit Lai Paul Yu
University of California, San Diego CA, USA
For contributions to semiconductor waveguide modulators and detectors

Han-Ping Shieh
National Chiao Tung University, Hsinchu, Taiwan
For leadership in the display and optical data storage industries

Yong Lee
Korea Advanced Institute of Science and Technology, Daejeon, Korea
For contributions to photonic devices based upon vertical cavity surface emitting lasers and photonic crystals

Fumio Koyama
Tokyo Institute of Technology, Yokohama, Japan
For contributions to semiconductor optical devices for broadband optical communications

Kazuo Hagimoto
Nippon Telegraph and Telephone Corporation (NTT), Kanagawa, Japan
For contributions to very large capacity optical transmission systems

Akihiko Kasukawa
Furukawa Electric Company, Ltd., Yokohama, Japan
For contributions to high power semiconductor lasers as pump sources for optical amplifiers

Hiroki Hamada
Sanyo Electric Co., Ltd., Osaka, Japan
For contributions to red semiconductor laser diodes and polycrystalline silicon thin-film transistors

Susumu Noda
Kyoto University, Kyoto, Japan
For contributions to photonic crystals and nanophotonics

Patrick Iannone
AT&T Laboratories, Red Bank NJ, USA
For contributions to network architectures and enabling technologies for fiber access

Ann Von Lehmen
Telcordia Technologies, Red Bank NJ, USA
For contributions to optical network architectures and technologies

Janet Jackel
Telcordia Technologies, Red Bank NJ, USA
For contributions to optical communications

Eric VanStryland
University of Central Florida, Orlando FL, USA
For contributions to nonlinear optics and the development of Kramers-Kronig relations to ultrafast nonlinearities

Naomi Halas
Rice University, Houston TX, USA
For contributions to metallic nanoshells and nanoparticles with tailorable optical properties and applications in biotechnology and chemical sensing

Diana Huffaker
University of New Mexico, Albuquerque NM, USA
For development of optoelectronic materials and processing

Jia-Ming Liu
University of California, Los Angeles, Los Angeles CA, USA
For contributions to the control and applications of nonlinear dynamics of lasers

David Welch
Infinera Corporation, Sunnyvale CA, USA
For contributions to semiconductor lasers and photonic integrated circuits

News (cont'd)

Radhakrishnan Nagarajan
Infinera, Sunnyvale CA, USA
For contributions to high-bandwidth semiconductor laser and photonic integrated circuit technologies

Milton Chang
Incubic Venture Fund, Mountain View CA, USA
For technical entrepreneurship and leadership in photonic technologies

Martin Fejer
Stanford University, Palo Alto CA, USA
For contributions to nonlinear optical materials and guided wave optics

Ann Bryce
University of Glasgow, Glasgow, UK
For contributions to compound semiconductor integrated optoelectronic devices

Peter Blood
Cardiff University, Cardiff, UK
For contributions to quantum confined lasers

Jose Capmany
Universidad Politechnica De Valencia, Valencia, Spain
For contributions to photonic processing of microwave signals

Avraham Gover
Tel-Aviv University, Tel-Aviv, Israel
For contributions to free electron lasers and superradiant bunched e-beam radiators

IEEE/LEOS Awards

Call for Nominations

Nominations for 2008 LEOS William Streifer Award for Scientific Achievement, the Engineering Achievement Award, the Aron Kressel Award, and the Distinguished Service Award are now being solicited for submission to the LEOS Executive Office. The deadline for nominations is 30 April. In order to facilitate the nomination procedure, a nomination form is found on page 19. Full nominations are required at the time of submission, and include, the statement of contributions, curriculum vitae, and endorsers' letters (which may be sent separately).

IEEE/LEOS William Streifer Scientific Achievement Award

The IEEE/LEOS William Streifer Scientific Achievement Award is given to recognize an exceptional single scientific contribution, which has had a significant impact in the field of lasers and electro-optics in the past 10 years. The award is given for a relatively recent, single contribution, which has had a major impact on the LEOS research community. It may be given to an individual or a group for a single contribution of significant work in the field. No candidate shall have previously received a major IEEE award for the same work. Candidates need not be members of the IEEE or LEOS. The award is administered by the Streifer Awards Committee and presented at the LEOS Annual Meeting.

IEEE/LEOS Engineering Achievement Award

The IEEE/LEOS Engineering Achievement Award is given to recognize an exceptional engineering contribution that has had a significant impact on the development of lasers or electro-optics technology or the commercial application of technology within the past 10 years. It may be given to an individual or a group for a single contribution of significant work in the field. The intention is to recognize some significant engineering contribution which has resulted in development of a new component, a new processing technique, or a new engineering concept which has had a significant impact in either bringing a new technology to the market, significantly improving the manufacturability of a component or device, or creating a new technology which will greatly accelerate or stimulate R&D. No candidate shall have previously received a major IEEE award for the same work. Candidates need not be members of the IEEE or LEOS. The award is administered by the Engineering Awards Committee and presented at the LEOS Annual Meeting.

IEEE/LEOS Aron Kressel Award

The Aron Kressel Award is given to recognize those individuals who have made important contributions to opto-electronic device technology. The device technology cited is to have had a significant impact on their applications in major practical systems. The intent is to recognize key contributors to the field for developments of critical components, which lead to the development of systems enabling major new services or capabilities. These achievements should have been accomplished in a prior time frame sufficient to permit evaluation of their lasting impact. The work cited could have appeared in the form of publications, patents products, or simply general recognition by the professional community that the individual cited is the agreed upon originator of the advance upon which the award decision is based. The award may be given to an individual or group, up to three in number. The award is administered by the Aron Kressel Awards Committee and presented at the LEOS Annual Meeting.

IEEE/LEOS Distinguished Service Award

The Distinguished Service Award was established to recognize an exceptional individual contribution of service that has had significant benefit to the membership of the IEEE Lasers and Electro-Optics Society as a whole. This level of service will often include serving the Society in several capacities or in positions of significant responsibility. Candidates should be members of LEOS. The award is administered by a committee consisting of the President-Elect, Chair; two Past Presidents, and the Vice President of Finance & Administration and is presented at the LEOS Annual Meeting.

A list of previous winners and awards information can be found on the LEOS Home Page at www.i-LEOS.org.

Nomination Form for IEEE/LEOS Awards

Please check the appropriate award category:

☐ Quantum Electronics (16 Feb deadline)

☐ Streifer Scientific Achievement (30 April deadline)

☐ Engineering Achievement (30 April deadline)

☐ Aron Kressel (30 April deadline)

Separate forms are available for the Distinguished Lecturer, Distinguished Service, Young Investigator, and John Tyndall Awards

1. Name of Nominee (for joint nominations, give the names, address information of the co-workers on a second sheet.

____

2. Nominee's Address ______________________________

____

____

____

3. Nominee's Phone: ____________________ Fax: ____________________

   Email: ______________________________________

4. Proposed Award Citation (20 words or less)

____

____

5. On separate sheets attach:

   a. Statement of specific contribution(s) that qualify Nominee for Award, as well as other related accomplishments (**maximum of two pages**).

   b. Nominee's curriculum vita

   c. Endorsers: List the names, affiliations, addresses, and emails of individuals who have agreed to write letters of support. (Minimum of three supporting letters required; maximum of five permitted. No more than five letters will be reviewed by the Committee. Letters may accompany nomination or be submitted directly to IEEE LEOS prior to the nomination deadline.) Letters of recommendation are to be considered confidential and are not to be released to anyone other than IEEE-LEOS awards staff.

6. Your name: ______________________________________

   Phone: ____________________ Fax: ____________________

   Email: ______________________________________

Send nomination information with supporting material to:
IEEE/LEOS Awards Committee; 445 Hoes Lane; Piscataway, NJ 08854
Fax: +1 732-562-8434; email: soc.leo@ieee.org

Nomination Form for LEOS Distinguished Service Award

Deadline: 30 April

1. Name of Nominee:

2. Nominee's Address

3. Nominee's Phone: ______ Fax: ______

   Email: ______

4. Proposed Award Citation (20 words or less)

5. Attach a description of the Nominee's exceptional individual contribution of service that has had significant benefit to the membership of the IEEE Lasers & Electro-Optics Society as a whole. This level of service will often include serving the Society in several capacities or in positions of significant responsibility.

6. Your name: ______

   Phone: ______ Fax: ______

   Email: ______

Send nomination information with supporting material to:
IEEE/LEOS Awards Committee; 445 Hoes Lane; Piscataway, NJ 08854
Fax: +1 732-562-8434; email: soc.leo@ieee.org

7-06

2008 John Tyndall Award Recipient: Robert W. Tkach

Robert W. Tkach

The John Tyndall Award is jointly sponsored by the IEEE Lasers and Electro-Optics Society and the Optical Society of America. The award is presented annually to a single individual who has made outstanding contributions in any area of optical-fiber technology, including optical fibers themselves, the optical components used in fiber systems, as well as transmission systems and networks using fibers. The contributions which the award recognizes should meet the test of time and should be of proven benefit to science, technology, or society. The contributions may be experimental or theoretical. This award Nominees need not be members of the sponsoring societies. Corning Inc. endorses the award which consists of a glass sculpture, a scroll, and an honorarium. The deadline for nominations is August 10.

ROBERT W. TKACH is Director of the Transmission Systems Research department at Bell Laboratories, Alcatel-Lucent, Crawford Hill Location. His research has involved dispersion management, optical amplification, optical networking, and high-speed DWDM transmission systems. Prior to joining Bell Laboratories, he has been: Chief Technical Officer of Celion Networks, Division Manager of the Lightwave Networks Research Division at AT&T Labs, and a Distinguished Member of Technical Staff at AT&T Bell Laboratories. He has served as Chair of the Optical Fiber Communications Conference (OFC) Steering Committee and on the IEEE LEOS Board of Governors. He has been General Co-Chair of OFC, Vice-President of the Optical Internetworking Forum, and Associate Editor of the Journal of Lightwave Technology. He has received the Thomas Alva Edison Patent Award from the Research and Development Council of New Jersey and is a Fellow of the Optical Society of America, the IEEE, and AT&T.

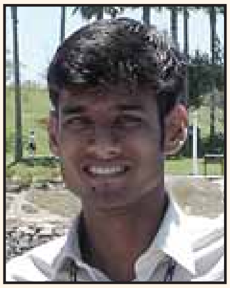
2007 LEOS Graduate Student Fellowship Recipients:

The IEEE Lasers & Electro-Optics Society established the Graduate Student Fellowship Program to provide Graduate Fellowships to outstanding LEOS student members pursuing graduate education within the LEOS field of interest. Applicants are normally in their penultimate year of study and receive the award for their final year and must be LEOS student members. Recipients are apportioned geographically in approximate proportion to the numbers of student members in each of the main geographical regions (Americas, Europe/Mid-East/Africa, Asia/Pacific). There are 12 Fellows per year. Each LEOS Graduate Fellow receives $5000 and a travel grant of up to $2500 to attend the LEOS Annual Meeting to accept their award. The deadline for nominations is 30 May.

LEOS is proud to present profiles of our 2007 LEOS Graduate Student Fellows:

Amit Agrawal	Maria Garcia Larrode	Yannick Keith Lize	Joris Van Campenhout
Maria Ana Cataluna	Zhensheng Jia	Cicero Martelli	Dirk van den Borne
Ignace Gatare Gahangara	Hannah Joyce	Houxun Miao	Lin Zhu

AMIT AGRAWAL received his Bachelor of Engineering degree in Electronics and Telecommunications in 2002 with Honors from Pt. Ravishankar Shukla University, India. In 2005, he received M.S. degree in Electrical Engineering from the University of Utah. His Masters thesis work titled, “Fiber-optic Laser Doppler Velocimeter to Measure Microcirculatory Flow Measurements” was carried out under the guidance of Prof. Douglas Christensen.



Amit Agrawal

Since 2005, he has been working towards his Ph.D. degree in Electrical Engineering at the University of Utah, and expected to finish in 2008. He is working with Prof. Ajay Nahata, and his current research interest lies in exploring the physics and applications of resonance phenomena at THz frequencies. In particular, his current research is focused on the fabrication and characterization of plasmonic metamaterials and guided-wave devices, and using this information to develop unique and useful applications. His work on the transmission properties of aperiodic aperture arrays was published in Nature and news articles discussing this work appeared in MIT Technology Review, NewScientist, EE Times, MSNBC, LiveScience etc. His work on coupling shaped THz pulses to metal wire waveguides was highlighted in Laser Focus World. Based on the knowledge gained through these investigations, he is currently extending this work to develop surface plasmon based waveguide devices, which could be used to create THz guided-wave optoelectronic circuits. He is an author and coauthor of 15 journal papers and >40 invited/

contributed conference papers. Amit is a recipient of the 2006 University of Utah Graduate Research Fellowship and is IEEE/LEOS Graduate Student Fellow. He is also the recipient of the prestigious 2007 D. J. Lovell Scholarship from the International Society of Optical Engineering (SPIE).

MARIA ANA CATALUNA received the Physics Engineering degree from the Instituto Superior Técnico (IST), Lisbon, Portugal, in 2001. She has been committed to research in ultra-fast laser physics since her time as an undergraduate and worked as a research assistant from 2000 to 2003 in the Group of Lasers and Plasmas at IST. In 2003, she obtained a scholarship from the Portuguese Government (Foundation for Science and Technology) that enabled her to pursue her Ph.D. studies at the University of St Andrews, Scotland. In December 2007, she concluded her Ph.D. in Physics, where her research work focused on the ultrashort-pulse generation from quantum-dot semiconductor diode lasers.


Maria Ana Cataluna

Maria Ana has authored and co-authored over 30 peer reviewed journal publications and conference presentations, including a review paper in Nature Photonics and an invited contribution to the Encyclopaedia of Nanoscience and Nanotechnology (second edition), on the subject of ultrafast lasers based on quantum-dot materials.

She also serves as an active reviewer for the IEEE Journal of Quantum Electronics and Applied Physics Letters.

Maria Ana is currently a post-doctoral research fellow at the University of Dundee, Scotland, where she is engaged in the investigation of innovative mode-locking regimes in quantum-dot lasers and also in the generation of mid-IR radiation using novel quasi phase-matched semiconductor crystals.

GATARE GAHANGARA IGNACE received his M.Sc. degree in Electrical Engineering from the *Faculté Polytechnique de Mons*, Mons, Belgium, in 2004. Since 2004, he is working towards his Ph.D jointly at the *Vrije Universiteit Brussel* (VUB), Belgium, and the CNRS *Laboratoire des Matériaux Optiques, Photonique et Systèmes* (LMOPS), a common laboratory between the *Ecole Supérieure d'Electricité* (Supélec) and the *Université Paul Verlaine*, Metz, France. His current research interests include experimental and theoretical investigations of polarization switching dynamics, injection-locking and chaos synchronization in vertical-cavity surface-emitting lasers (VCSELs) subject to optical injection. He has authored about 8 research papers in international journals and contributed to about 20 international conferences. He served as reviewer for the *IEEE Journal of Quantum Electronics and the IEEE Journal of Selected Topics in Quantum Electronics*.


Gatare Gahangara Ignace

He carried out (summer 2003) an internship in the research and development department of *SEE Telecom*, a Belgian telecom equipments provider. His activities involved technical test and specifications of the optical amplifier and the add-drop multiplexer modules for the MANSYS (Metropolitan Access Network System) project. After completion of his M.Sc degree, he received the Faculty Prize of "*Best Master Thesis in Telecommunications*" granted by SEE telecom (2004) and the Nick Forbat Prize awarded to the "*Meritorious Student of the Year*" (2004).

Currently, he is a student member of the *IEEE Lasers and Electro-Optic Society* (LEOS) and of the *Optical Society of America* (OSA). "It was a great honor for me to receive the 2007 LEOS Graduate Student Fellowship which is, indeed, highly motivating."

MARÍA GARCÍA LARRODÉ was born in Zaragoza (Spain) in 1977. She received the M.Sc. degree in Telecommunications Engineering from the Centro Politécnico Superior, University of Zaragoza, in 2001, after having carried out her Masters thesis at Siemens AG in Munich (Germany) in 2000. Her Masters thesis dealt with enhanced-GPRS performance in GSM radio networks, study for which she carried out simulations, analysis and evaluation of EGPRS on link and system level.


María García Larrodé

From 2000 to 2004, she worked as a systems engineer in mobile radio access networks at

Siemens AG Germany, focusing on system analysis and design for the base station subsystem of GSM and GPRS networks, radio resource management and signaling, performance evaluation of GSM/GPRS/EDGE and UMTS networks, and conformance assessment of mobile devices. She also contributed to standardization activities and to patent applications on channel allocation strategies for radio communication systems.

In March 2004, María joined the COBRA Research Institute at the Eindhoven University of Technology (The Netherlands) where she has conducted research work toward the Ph.D. degree in the area of broadband wireless access networks employing radio over fiber techniques. Her Ph.D. work has been defined within the framework of a Dutch national IOPGenCom project and has also delivered contributions to other international projects like IST-Nefertiti, IST-MUSE and IST-ISIS. She has published the main results of this work in 7 IEEE/IEE/OSA journal articles and 10 international conference papers. In addition, she has contributed to over 18 papers as a co-author. She has also acted as a peer-reviewer for *IEE Procedings in Optoelectronics and IEEE Journal of Lightwave Technology*.

María's work has been recognized with the *KIvI Niria Telecommunication Prize 2006*, to the best Ph.D. research work in the field of Telecommunications in a Dutch University, awarded by the Royal Institute of Engineers and supported by the Dutch Ministry of Economics Affairs, and with the *IEEE LEOS – Graduate Student Fellowship Award 2007*, awarded by the IEEE Lasers & Electro-Optics Society to outstanding LEOS student members.

ZHENSHENG JIA received the B.E. and M.S.E degree in Physical Electronics and Optoelectronics from the Electronic Engineering Department, Tsinghua University, Beijing, China, in 1999 and 2002, respectively. He is currently working toward the Ph.D. degree under the supervision of Prof. Gee-Kung Chang in the School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta.


Zhensheng Jia

During 2002–2004, Jia worked as a Research Engineer on transport and access networks in the Optical System and Network Lab, China Telecom Beijing Research Institute (CTBRI), Beijing. He spent two summer internships in the field of chirp-controlled direct modulated transmitter and optical equalizers for metro optical links at NEC Laboratories, America in 2006 and 2007. His research interests include optical millimeter-wave signal generation, transmission and processing for symmetric optical-wireless access networks, high-speed TDM/WDM PON, ultra-high data rate (>=100 Gb/s) optical transmission systems, and nonlinear optical signal processing. He has been author or co-author of over 50 peer-reviewed journal articles and conference papers. He also serves as an active reviewer for IEEE Photonics Technology Letters, IEEE/OSA Journal of Lightwave Technology, IEEE Microwave and Wireless Components Letters, IET Optoelectronics, and Optics Communications. He was one of the recipients of the 2007 IEEE/LEOS Graduate Students Fellowship.

"It is a great honor to receive the 2007 LEOS Graduate Student Fellowship Award! This recognition will encourage me to work harder and continue my Ph.D. research and future career in this field. Additionally, I would like to express my sincere gratitude to IEEE/LEOS for being supportive to students!"

HANNAH JOYCE received her B.E. (Electrical and Electronic Engineering) and B.Sc. (Pharmacology) degrees from the University of Western Australia, Perth, Australia, in 2004. She is currently working towards her Ph.D. with the Semiconductor Optoelectronics and Nanotechnology Group at The Australian National University, Canberra, Australia. Her project aims to develop III-V semiconductor nanowires and nanowire heterostructures for applications in optoelectronic devices. "I feel honoured and I am very grateful to receive an IEEE-LEOS Graduate Student Fellowship - 2007. I wish to give my heartfelt thanks to my supervisors Prof. C. Jagadish and Dr. H. H. Tan, and to my coworkers and collaborators, for their great support, guidance and mentoring throughout my Ph.D. studies."


Hannah Joyce

YANNICK KEITH LIZE obtained the BSc in Applied Physics from Concordia University in Montreal in 2001 and the M.Sc. in Physics from École Polytechnique in 2004 under the supervision of Prof. Suzanne Lacroix, Prof. Nicolas Godbout and Dr Christian Malouin. He is soon to defend his thesis on optical differential phase shift keying generation, transmission and demodulation from École Polytechnique de Montreal under Prof. Nicolas Godbout with a co-supervision from Prof. Alan E. Willner at the University of Southern California.


Yannick Keith Lize

During his Ph.D. work, Yannick has done internships at the Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS) in Sydney, Australia under Prof. Benjamin J. Eggleton working on silica nanostructured nanowires, at the Centre for Ultra-Broadband Information Networks (CUBIN) in Melbourne, Australia under Prof. Rod Tucker and Thas Nirmalathas working on PMD emulation, at Alcatel/Lucent Bell Labs Crawford Hill, NJ, under Dr Randy Giles and Dr Xiang Liu on DPSK optical packet encoding, and at the University of Southern California under Prof. Alan E. Willner on DPSK demodulation and optical error correction.

Besides being a recipient of the IEEE LEOS Graduate Student Fellowship in 2007, he has also received the Canadian Institute for Photonic Innovations (CIPI) student exchange grant in 2004, 2005 and 2006, the SPIE Scholarship in Optical Science and Engineering in 2005 and 2006, the OSA/Milton Chang student travel grant in 2005 and 2006, the 2003 and 2005 Student Presenter award of the Canadian Association of Physicists, the 2004 New Focus student travel grant and the Natural Sciences and Engineering Research Council of Canada eMPOWR research bursary in 2004. He has 20 peer-reviewed publications to his credit as well as 40 international conference papers including 2 invited papers, and 5 patents.

Yannick is currently director of R&D for advanced modulation format devices at ITF Laboratories in Montreal leading the development efforts on next generation DPSK, DQPSK and coherent demodulation devices. He is a member of the IEEE LEOS, IEEE ComSoc, OSA and SPIE. Yannick is a member of the OSA Membership and Education Services (MES) and the technical program committee of the IEEE 7th International Conference on Optical Communications and Networks (ICOCN 2008).

"I want to thank the IEEE LEOS for awarding me one of the 2007 Graduate Student Fellowships. It is a tremendous honor and I sincerely thank all my friends and collaborators but especially my PhD supervisors, Prof. Nicolas Godbout at École Polytechnique de Montreal and Alan E. Willner at the University of Southern California."

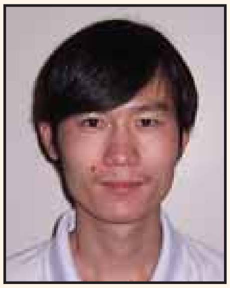
CICERO MARTELLI was born in Curitibanos (SC, Brazil) and holds BEE and MSc degrees from the Federal University of Technology-Parana. In February 2008 he will submit his PhD thesis in photonics on the work he carried out at the Interdisciplinary Photonics Laboratories within University of Sydney's School of Chemistry and Optical Fibre Technology Centre. During his career Cicero has been an exchange student at the University of Applied Sciences – Berlin and a visiting researcher at the University of Aarhus. In March 2008 he will join the Laboratory of Fiber Optic Sensors within the newly established Centre of Sensors Technology for the Petroleum Industry and the Department of Mechanical Engineering at PUC-Rio as an assistant professor. Cicero has co-authored over 70 journal and conference papers and is a reviewer for the IEEE Photonics Technology Letters and Semina. His research interest includes optical communications, diffractive structures, optical sensors, waveguides, porphyrins and surface science.


Cicero Martelli

In 2007 he was awarded an IEEE LEOS Graduate Student Fellowship and for this the following people/institutions should be thanked:

- IEEE LEOS for promoting this important award and acknowledging student achievements;
- Prof. John Canning, PhD supervisor, for his guidance, support and tireless and timeless assistance;
- CAPES-Brazil for a full student scholarship and ARC-Australia for general research support during the PhD project;
- Prof. Maxwell J. Crossley, Prof. Martin Kristensen and Dr. Mattias Aslund for support and assistance to develop some of ideas behind the PhD project.

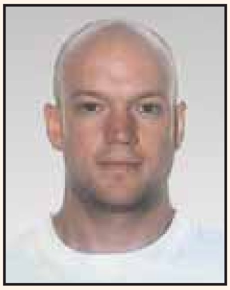
Career Section (cont'd)


Houxun Miao

HOUXUN MIAO received the B. S. degree in Mechanical Engineering and the M. S. degree in Optical Engineering from Tsinghua University, Beijing, China, in 2002 and 2004, respectively. He is currently working toward the Ph.D. degree in the School of Electrical and Computer Engineering under the supervision of Prof. Andrew M. Weiner at Purdue University.

His research focuses on polarization mode dispersion (PMD) compensation in optical fiber transmissions and ultralow-power optical pulse measurements. He proposed and experimentally demonstrated the concept of all-order PMD compensation via wavelength parallel Jones matrix characterization and correction. He demonstrated polarization insensitive ultralow-power second-harmonic generation frequency-resolved optical gating by using an aperiodically poled lithium niobate (A-PPLN) waveguide as the nonlinear medium. Currently, he is working on single-shot single-frame characterization of arbitrarily shaped optical waveforms.

He received the Andrews Fellowship from Purdue University (2004-2006). He is one of the recipients of the 2007 IEEE/LEOS Graduate Student Fellowships.


Joris Van Campenhout

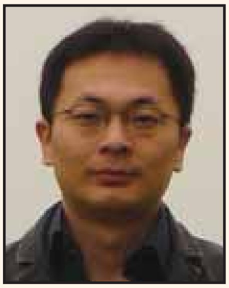
JORIS VAN CAMPENHOUT was born in Brussels, Belgium, in 1979. He received the M.Sc. degree in Engineering Physics in 2002, from Ghent University, Belgium. Since October 2002, he has been working towards a Ph.D. degree in Electrical Engineering, at the Photonics Research Group at the same University. His research interests include the design and fabrication of on-chip optical networks, based on silicon-on-insulator and the heterogeneous integration with indiumphosphide through bonding technology. For his Ph.D. work, his focus is on the development of an electrically driven silicon-integrated microdisk laser. He has been author or co-author of over 10 peer-reviewed journal papers. Joris Van Campenhout acknowledges the support from the Research Foundation – Flanders, Belgium for a doctoral grant.


Dirk Van den Borne

DIRK VAN DEN BORNE was born in Bladel, The Netherlands, on October 7, 1979. He received his M.Sc. degree in Electric Engineering from the Eindhoven University of Technology, The Netherlands, in 2004.

During his Master studies he has done research at Fuijtsu laboratories Ltd. in Kawasaki, Japan and the Siemens AG in Munich. Currently, he is working towards a Ph.D. degree in Electrical Engineering at the Eindhoven University of Technology in collaboration with Nokia Siemens Networks (before Siemens AG) in Munich. He focuses on improvements in long-haul transmission systems using robust modulation formats, alternative dispersion compensation schemes and electronic impairment mitigation. He has authored and co-authored more than 50 peer-reviewed papers and conference contributions of which 10 where invited contributions. In addition he wrote 5 patents related to fiber-optic communications. In 2007 he received the KIVI-NIRIA Telecommunication Award and the IEEE/LEOS Graduate Student Fellowship.

"It is a great honor to receive the IEEE/LEOS Graduate Student Fellowship. This recognition for my Ph.D. work is a strong encouragement to further pursue a career in the fiber-optic communication industry. I would like to thank my colleagues at the Eindhoven University of Technology and Nokia-Siemens networks for the support and significant contributions to my research. As well, I would like to thank LEOS for their active support of student members, which can truly make a difference in opening up career opportunities."


Lin Zhu

LIN ZHU received a B.S. and M.S. degrees in Electrical Engineering from Tsinghua University, Beijing, China, in 2000 and 2002, respectively. He also received the M.S. degree in Electrical Engineering from California Institute of Technology (Caltech), Pasadena, in 2004. He is currently working toward the Ph.D. degree in Electrical Engineering under the supervision of Prof. Amnon Yariv, and Prof. Axel Scherer at Caltech.

His research interests include semiconductor lasers, periodic photonic structures, optical resonators and hybrid integration of optical systems with microfluidic systems. His recent project focus on using two dimensional photonic crystal Bragg structures to control the spectral and spatial mode of large-area semiconductor lasers. He has been author or co-author of more than 30 refereed journal articles and conference papers. He also serves as an active reviewer for IEEE/OSA Journal of Lightwave Technology, IEEE Photonics Technology Letters, Optics Communications, Optics Letters, and Optics Express.

2007 LEOS Best Student Paper Award Recipients:

The LEOS Best Student Paper Awards are open to students from universities whose papers have been accepted for presentation at the LEOS Annual Meeting. The top five finalists receive certificates of recognition and monetary awards ranging up to $1000.
The results for the 2007 LEOS Best Student Paper Award are as follows:

1st Place -	Koji Otsuka	Runner Up -	Chen-Bin Huang
2nd Place -	Tomohiro Amemuya	Runner Up -	Yoshiaki Takata
3rd Place -	Christophe Antoine	Runner Up -	Kai Zhao


Koji Otsuka

KOJI OTSUKA received his B.S. degree in Electric and Electronic Engineering from the Kyoto University in 2007. He is now a M.S. student at the Department of Electronic Engineering, Kyoto University. Koji is a student member of the IEEE Laser and Electro-Optic Society (IEEE/LEOS) and the Japanese Society of Applied Physics (JSAP).His current research is focused on high power operation of photonic crystal surface emitting laser by increasing lasing area. He has designed the new laser structure which enables ten-fold enlargement of lasing area. “It was such an honor to receive the LEOS 2007 Best Student Paper Award. It encourages me to continue striving in this exciting field.”


Tomohiro Amemiya

TOMOHIRO AMEMIYA received the B.S. and M.S. degrees in Electronic Engineering from the University of Tokyo in 2004 and 2006. He is now a Ph.D. student in Integrated Photonics Laboratory at Research Center for Advanced Science and Technology (RCAST), the University of Tokyo. His research interests are in the physics of semiconductor light-controlling devices, optical spin-related devices, and photonic integrated circuits, and in the processing technology to fabricate these devices. His Ph.D. research mainly focuses on semiconductor waveguide optical isolators that can be monolithically combined with other optical devices in photonic integrated circuits.

Tomohiro Amemiya is a student member of the IEEE/LEOS, the Optical Society of America (OSA), and the Japan Society of Applied Physics (JSAP).


Christophe Antoine

CHRISTOPHE ANTOINE received the Diplôme d'Ingénieur from the École Supérieure d'Électricité (Supélec), Gif-sur-Yvette, France, and the M.S. and PhD degrees in Electrical Engineering from Stanford University, Stanford, CA. During his graduate work at Stanford, he worked with Prof. Olav Solgaard on micromachined deformable optical gratings. His research interests include the design, fabrication, and characterization of diffractive optical microsystems using MEMS technology for applications in passive components of optical fiber networks, tunable lasers, and spectroscopy. His academic career was completed by field work at research institutions (CNRS-LGEP, Gif-sur-Yvette, France and CSIC-IMM, Tres Cantos, Spain) and at major consumer electronics companies (Philips, Aachen, Germany and Sony, Tokyo, Japan).

Career Section (cont'd)

Chen-Bin Huang

CHEN-BIN HUANG was born in Taipei, Taiwan, in August, 1975. He received a B.S. degree in Electrical Engineering from National Tsing-Hua University, Hsinchu, Taiwan in 1997, and a M.S. degree in Electro-Optical Engineering from National Chiao-Tung University, Hsinchu, Taiwan in 1999. He is currently working towards the Ph.D. degree at the School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN. His current research interests focuses on applications of spectral line-by-line pulse shaping and characterizations of optical frequency combs.

From 1999 to 2003, he joined the Opto-Electronics & Systems Laboratories (OES), Industrial Technology Research Institute (ITRI), Taiwan as a research engineer, developing passive optical fiber devices. In summer 2002, he was a visiting scientist at the Materials Research Institute, Northwestern University, Evanston, IL. He has been an author/co-author of 8 journal papers and 16 conference papers. He holds 6 U.S. patents and 13 Taiwan patents.

Yoshiaki Takata

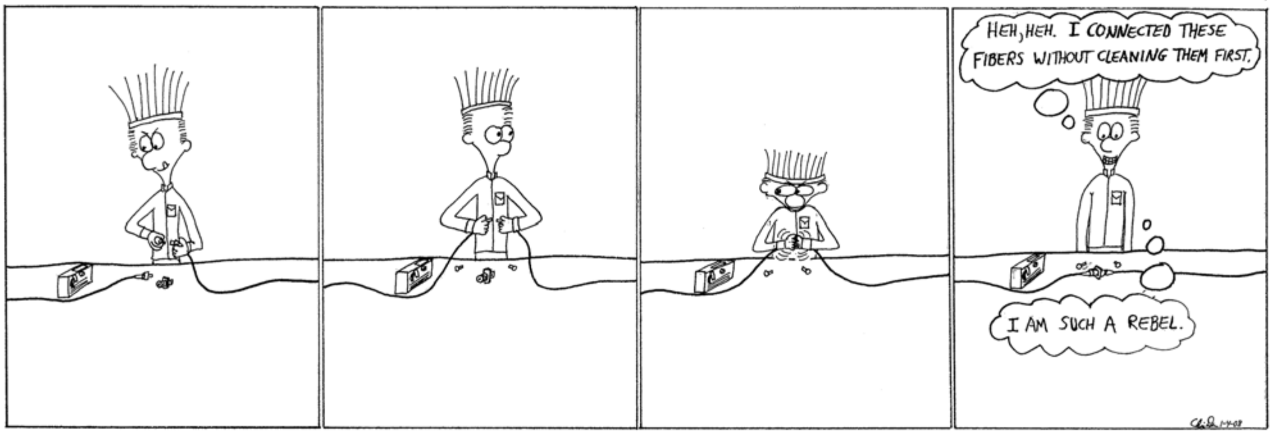
YOSHIAKI TAKATA received the Bachelor of Engineering degree from University of Tsukuba, Ibaraki, Japan,in 2006. He is now a M.E. student at department of Pure and Applied Sciences, University of Tsukuba. Since 2005, he has been a member of the Center of Tsukuba Advanced Research Alliance (TARA), University of Tsukuba. His current research is focused mainly on selective area growth of InAs-QDs towards photonic crystal and quantum dots based all optical integrated circuit devices.

Mr. Takata is a student member of the Japan Society of Applied Physics (JSAP).

Kai Zhao

KAI ZHAO received his B.S and M.S with honor degrees in Applied Physics in 1999 and 2002 from University of Science and Technology of China. In 2002, he started his Ph.D. study in physics department at University of California San Diego, where he works in Prof. Yu-hwa Lo's research group. His research interests include characterization of semiconductor quantum dots, developing advanced III-V Single Photon Avalanche Detectors. For the III-V SPADs project, he developed the first negative feedback III-V Single Photon Avalanche Detector which has demonstrated the self-quenching self-recovery capability and has achieved ultra low excess noise in Single Photon detection Mode. He is currently a student member of IEEE.

"Nick" Cartoon Series *by Christopher Doerr*



The 2008 IEEE Photonics Award Recipient: Joe C. Campbell

The IEEE Photonics Award was established in 2002. The award is presented for outstanding achievements in photonics. It may be presented to an individual or a team of not more than three. Photonics is defined as the science and technology of generating and harnessing light and other forms of radiant energy whose quantum unit is the photon. It is awarded for, but not limited to: light-generation, transmission, deflection, amplification and detection and the optical/electro-optical compo entry and instrumentation used to accomplish these functions. Also included are storage technologies utilizing photonics to read or write data and optical display technologies. It also extends from energy generation/propagation, communications, information processing, storage and display, biomedical and medical uses of light and measurement applications. Recipient selection is administered by the Technical Field Awards Council of the IEEE Awards Board.

Joe Charles

JOE CHARLES CAMPBELL is a leading innovator in the field of photonics for his role in the development of laser light detectors used in fiber optics systems in telephone and other telecommunication systems to receive voice and data over fiber optics. Dr. Campbell is recognized for his significant contributions in high-speed, low-noise avalanche photodiodes (APDs), which have led to key advancements in this field. Dr. Campbell's avalanche photodiodes are able to convert pulses of light into electrical information during long distance telecommunications at high speeds with very low distortion or noise. He is currently a Lucien Carr Professor of Electrical and Computer Engineering at the University of Virginia, Charlottesville. An IEEE Fellow, he has co-authored eight book chapters, 330 articles for refereed technical journals and more than 300 conference presentations. Dr. Campbell has previously received the IEEE Millennium Medal, the IEEE William Streifer Achievement Award from the IEEE Lasers and Electro-Optics Society, the Nicholas Holonyak Award from the Optical Society of America, AT&T Bell Laboratories Distinguished Member Award, and was inducted into the National Academy of Engineering. Dr. Campbell received a Bachelor of Science degree in Physics from the University of Texas at Austin, and his Master of Science and Doctorate degrees in Physics from the University of Illinois at Urbana-Champaign.

Newly Elected Members to the Board of Governs:

JANET JACKEL is head of the Optical Networking Systems Engineering Research group within Applied Research at Telcordia, in Red Bank, NJ. Dr. Jackel earned her BA in Physics from Brandeis University in 1969, and the Ph.D. degree, also in Physics, from Cornell University in 1976, with a thesis on "Nonlinear Optical Spectroscopy in the Excitonic Region of Cadmium Sulfate." In 1976 she joined Bell Laboratories, in Holmdel, NJ, where her research was aimed at improving the processing of optical materials, primarily lithium niobate and glass waveguides; during this time she invented proton exchange in lithium niobate. After the breakup of AT&T in 1984, she moved to Bellcore (now Telcordia) where her research evolved with the needs of the rapidly evolving optical communications industry. During this time she moved from an emphasis on materials and devices to systems, networks, and applications of optical communications technology. For example, she took a lead role in the DARPA-supported MONET project, which designed, built, and carried out experiments on a then-novel WDM network connecting several US government agencies. For the past seven years she has managed a group that targets research in optical communications and technology, while continuing to carry out her own research, most recently in OCDMA, avionics and the use of optics for processing RF signals.


Janet Jackel

Dr. Jackel has published over 100 papers in technical journals and has presented much of this work in talks (including numerous invited talks) at professional conferences. She holds about fifteen patents for waveguide processing, optical device design, and communications architectures, with further patents pending. Dr. Jackel is a Fellow of the IEEE and of the Optical Society of America. She has received an IR&D 100 award and several Bellcore/Telcordia CEO Awards.

In the past Dr. Jackel has been an associate editor for Photonics Technologies Letters, and has served on program committees for the Optical Fiber Communications (OFC) Conference, for the Optical Society's Integrated Photonics Research and Applications (IPRA) Conference as well as its predecessor, the Integrated and Guided Wave Optics (IGWO) Conference, and for years was on the program committee for NIST's Symposium on Optical Fiber Measurements. Last fall she was editor for a feature issue of the Optical Society's Journal of Optical Networking (JON) which targeted Optical CDMA. Currently she is an Associate Editor for the IEEE/LEOS Journal of Lightwave Technology.

As a new member of the BoG, Dr. Jackel would like to concentrate on the accessibility of online technical literature. To achieve this we will need to develop a model which makes economic sense: to make information available at costs that will be acceptable to those who need it while supporting the costs of publishing. This requires more than simply moving the existing journals to electronic publication; we should consider different ways to organize the journals and perhaps expansion of the topics covered, as the applications of optics expand.

TON (A.M.J.) KOONEN was born in Oss, The Netherlands, in 1954. He obtained his M.Sc. degree cum laude in Electrical Engineering at Eindhoven University of Technology, The Netherlands, in 1979. In the same year, he started his career in Philips Telecommunication Industry, in applied research on high-speed optical communication devices and systems. After the merger, he became a member of technical staff and in 1987 the technical manager of an applied research group on broadband fibre-optic systems at Bell Laboratories in Lucent Technologies. He and his team of up to 25 technical staff members worked on wavelength-multiplexing techniques for access and metro systems, analog and burst-mode optical amplifiers, CATV fibre-optic distribution networks, ATM-PON systems, VB5 broadband interfaces, and on high-speed transmission system electronics. Next to his industrial position, he has been a part-time professor in photonic networks at Twente University, The Netherlands, from 1991 to 2000. Since 2001, he is a full professor in the Electro-Optical Communication Systems group, a partner in the COBRA Institute, at Eindhoven University of Technology, The Netherlands. In 2004, he became the chairman of this group.


Ton (A.M.J.) Koonen

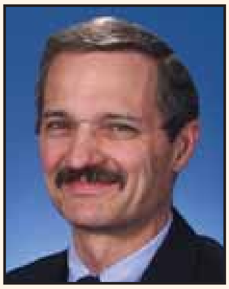
Ton's main research interests are currently in broadband fibre access and in-building networks, and in optical packet-switched networks. He has initiated and led several European and national R&D projects in this area, a.o. on label-controlled optical packet routed networks (the EC project STOLAS), on dynamically reconfigurable fibre access networks (fibre-coax, fibre-wireless, FTTH; in the EC projects TOBASCO, PRISMA, and HARMONICS), and on short-range multimode (polymer) optical fibre networks for in-building applications. He has published more than 250 conference and journal papers, and holds 3 US patents plus some national/European ones. Presently, he is involved in a number of access/in-home projects in the European FP6 IST Broadband for All programme (MUSE, e-Photon/ONe+, POF-ALL), and in the Dutch programmes Freeband and IOP Generieke Communicatie. He also will be involved in a number of projects in the new European FP7 programme (ALPHA, BONE, …), starting early 2008. He has served numerous times as an auditor and project proposal reviewer for the European Commission R&D programmes. He also is a member of the programme committee of several Dutch research initiatives.

Ton Koonen is an IEEE Fellow since 2007. When with Lucent Technologies, in 1999 he was awarded the Bell Labs Fellow title (the first one in Europe). He is a Member of LEOS Committee on Optical Networks and Systems since 2006, and a Member of Board of IEEE LEOS Benelux Chapter since 2000. He has been a member of the Technical Programme Committee of several conferences, and is a Technical Programme Committee co-chair of ECOC 2008. He has been a short course presenter on Metro and Access Networks at ECOC from 2002 to 2006. He is a reviewer for JLT, PTL, JSTQE, JON, Electronics Letters, Optics Express, and an editor for OSN.

Ton is married and has three teenage sons.

On the LEOS Board of Governors, Ton Koonen hopes to contribute to involve more young people, as they are the future of our community, and so to stimulate the influx of students in our field. Furthermore he would like to extend the LEOS relations outside the US, notably with the large R&D programmes ongoing in Europe which are a fruitful interaction of many academia and industries. The cross-fertilization of LEOS' field with other disciplines, such as wireless and computer technologies, can further increase LEOS' prominence and stimulate young people into our field.

JERRY R. MEYER completed his Ph.D. in Physics at Brown University in 1977. The same year he took a position at the Naval Research Laboratory in Washington DC, where he is now Head of the Quantum Optoelectronics Section. His research has centered on fundamental and applied studies of the optical and transport properties of semiconductors, as well as the design and development of novel optoelectronic devices. His recent research has sought to advance the performance of infrared lasers based on quantum heterostructures such as the type-II "W" laser, interband and quantum cascade lasers, large-area photonic-crystal distributed-feedback lasers, type-II antimonide photodiodes, and negative luminescence devices. He is co-inventor of the Quantitative Mobility Spectrum Analysis (QMSA), a comprehensive magneto-transport analysis technique which is marketed by Lake Shore Cryotronics. He has published more than 300 refereed journal articles, which have been cited over 5400 times, and has co-authored 20 patents and over 100 invited conference presentations. He is a Fellow of the Optical Society of America (2000), the American Physical Society (2001), the Institute of Electrical and Electronics Engineers (2004), and the Institute of Physics (2005). He received the NRL Edison Patent Award (2005), the NRL Edison Chapter Sigma Xi Award for Pure Science (2003), the Department of the Navy Technology Transfer Royalty Award (2003), the Federal Laboratory Consortium Award for Excellence in Technology Transfer (2001), the NRL Distinguished Contribution Allowance Award (1999), 4 NRL Special Act Awards (2001-2007), and 5 NRL Research Publication Awards.


Jerry R. Meyer

Dr. Meyer was Program Co-Chair of *CLEO* 2007, and will be General Co-Chair in 2009. He served on the *LEOS* Program Committee from 1993 to 2003, and was Chair of the Semiconductor Laser Subcommittee in 2000 and 2001. He Chaired the Journal of Applied Physics Editor Search Committee (2000), and Co-Chair the *International Conference on Narrow Gap Semiconductors* (2003), Mid-IR Optoelectronics: Materials & Devices (2002), and *SPIE Photonics West* Conference on *In-Plane Semiconductor Lasers* (2002). He has served on the Program Committee for numerous other meetings, and in a typical year referees 25-30 journal articles.

PETER WINZER was born in January 1973 in Vienna, Austria, he studied Electrical/Communications Engineering at the Vienna University of Technology where he received a Ph.D. degree in 1998. His academic work was largely supported by the European Space Agency (ESA) and was related to space-borne Doppler laser measurement and communication systems. It was back then that he specialized in advanced digital optical modulation and high-sensitivity detection. In November 2000 he joined Bell Labs (Holmdel, NJ, USA) as a Member of Technical Staff and was promoted to a Distinguished Member of Technical Staff in 2007. Living in the United States since 2000, he and his wife Andrea have been raising their three kids Karoline (2000), Benedikt (2002), and Nikolaus (2005). When time allows, he enjoys skiing, skating, hiking, and playing the piano.


Peter Winzer

He very much likes, the fruitful, problem-rich environment he found at Bell Labs, with its enormous scientific breadth and depth. At Bell Labs, "implementing the impossible" has become his guiding principle, regardless of seemingly insurmountable obstacles. He first focused on Raman amplification, but eventually returned to his favorite fields: optical modulation advanced optical receiver concepts, and digital signal processing techniques. He also spent some time on higher-layer data network architectures for dynamic data services. Since 2005 he has been heavily involved in 100-Gb/s electronically multiplexed optical transmission demonstrations for next-generation Ethernet and Optical Transport Network applications.

He is actively involved in the scientific community as an author, reviewer, editor, and conference/workshop organizer, currently chairing the Optical Communications subcommittees of both LEOS and CLEO. As a Member of the Optical Society of America (OSA) and a Senior Member of the IEEE, he highly values these scientific communities as a valuable platform for high-quality scientific exchange. He is a strong advocate of "quality instead of quantity", and his interest in serving on the LEOS BoG is fueled by the desire to foster the technical quality of LEOS in its journals, conferences, and meetings through establishing and maintaining effective quality control mechanisms and supporting means for rapid and wide dissemination of scientifically and professionally relevant material.

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- Up to $25 gift certificate toward one new Society membership.
- A letter of commendation to your employer on the achievement of Senior member grade (upon the request of the newly elected Senior Member.)
- Announcement of elevation in Section/Society and/or local newsletters, newspapers and notices.
- Eligibility to hold executive IEEE volunteer positions.
- Can serve as Reference for Senior Member applicants.
- Invited to be on the panel to review Senior Member applications.

The requirements to qualify for Senior Member elevation are, a candidate shall be an engineer, scientist, educator, technical executive or originator in IEEE-designated fields. The candidate shall have been in professional practice for at least ten years and shall have shown significant performance over a period of at least five of those years."

To apply, the Senior Member application form is available in 3 formats: Online, downloadable, and electronic version. For more information or to apply for Senior Membership, please see the IEEE Senior Member Program website: http://www.ieee.org/organizations/rab/md/smprogram.html

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New Senior Members

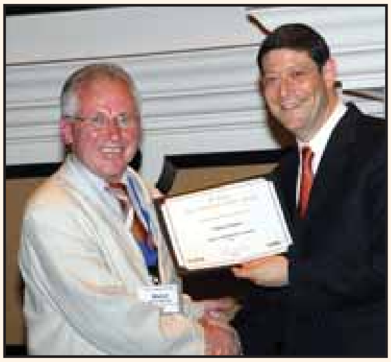
The following individuals were elevated to Senior Membership Grade thru November - December:

Ekaterina A. Golovchenko
Aman Al-Imari
Vipul Bhatnagar
James Dreiling
Benjamin J Eggleton
Mary A. Flavin
Jacob Lasri
Ka Suen Lee
Robert Lutwak
Thomas E. Murray
Willie W. Ng
Alexei N. Pilipetskii
Radan Slavik
Philip A. Slaymaker
B. Thomas Smith
Peter M. Smowton
Andreas Stohr
Hin Yong Wong
Sergey V. Zaitsev
Xiupu Zhang

The Largest Membership Increase Award of the IEEE Lasers & Electro-Optics Society for the IEEE LEOS Poland Chapter

On October 22, 2007, during the Awards Banquet of the IEEE LEOS Conference in Lake Buena Vista, Florida, the IEEE LEOS Poland Chapter received the Largest Membership Increase Award of the IEEE Lasers & Electro-Optics Society. Membership of the Chapter increased from 24 to 31 (i.e. by 29%) between 2006 and 2007

The Chapter was organized in 2001 (approved by IEEE LEOS on February 7 of that year), as a result of the efforts of Professor Marian Marciniak from the National Institute of Telecommunication, Warsaw, Poland. This effort was initiated in 1998. Professor Marciniak was the first Chapter Chairman, and was re-elected in 2002. Professor Krzysztof Abramski, Wroclaw University of Technology, was elected in 2003 and re-elected in 2004 as the second Chairman, and Professor W_odzimierz Nakwaski, Technical University of Lodz, became the third in 2005 and 2006. Professor Sergiusz Patela, Wroclaw University of Technology, is now Chairman-Elect.



Marian Marciniak receives the award for Largest Membership Increase on behalf of the IEEE/LEOS Poland Chapter from Alan Willner at the 2007 LEOS Annual.

The Chapter has concentrated on the organization of scientific conferences and facilitation of lectures from Distinguished LEOS Lecturers and other professors from leading research centers working in photonics, mostly on laser technology, theory and applications, and describing the latest achievements in this area. During last two years, the following researchers have given lectures for the Chapter members:

1. Petr G. Eliseev, Center for High Technology Materials, University of New Mexico, Albuquerque, USA (two lectures)
2. Jorge C. Rocca, Colorado State University, Fort Collins, Colorado, USA
3. Philip Russel, University of Erlangen-Nuremberg, Erlangen, Germany (LEOS DL)
4. Tomasz Rogowski, Scuola Superior, Santa Anna, Pisa, Italy
5. Chennupati Jagadish, Australia National University, Canberra, Australia (LEOS DL)
6. Marek Wartak, Wilfrid Laurier University, Waterloo, Ontario, Canada
7. Toshihiko Baba, Yokohama National University, Japan (LEOS DL)
8. Hussein T. Mouftah, University of Ottawa, Ontario, Canada (IEEE ComSoc DL)
9. Krassimir Panajotov, Vrije Universiteit Brussel, Brussels, Belgium
10. John O'Brien, University of Southern California, Los Angeles, California, USA (LEOS DL)
11. Masaya Notomi, NTT Basic Research Laboratories, Atsugi, Japan (LEOS DL)

The picture shows Professors Notomi and Nakwaski during a visit to the center of Lodz, the second greatest city of Poland, strictly speaking – the famous Piotrkowska Street, with the aid of 'riksha', the only accepted vehicle in this area.

The IEEE LEOS Poland Chapter was also a technical sponsor of the International Conferences on Transparent Optical Networks (ICTON), our flagship conference. The first six conferences were organized in Poland in Kielce (1999), Gdansk (2000), Kraków (2001), Warsaw (2002 and 2003), and Wroclaw (2004). Their international character has been enhanced by organizing subsequent ICTON conferences in Barcelona (Spain) in 2005, in Nottingham (UK) in 2006 and in Rome (Italy) in 2007. The next 10th Anniversary ICTON Conference, is going to be held in 2008 in Athens (Greece). Currently the ICTON conference is composed of many symposia and workshops and during the last 9th ICTON Conference in Rome, the following were organized:

- 6th European Symposium on Photonic Crystals (ESPC Symposium)
- 6th Workshop on All-Optical Routing (WAOR Workshop)
- 4th Global Optical & Wireless Networking Seminar (GOWN Seminar)
- 3rd Workshop on Reliability Issues in Next Generation Optical Networks (RONEXT Workshop)
- 3rd Photonic Integrated Components & Application Workshop (PICAW Workshop)
- 2nd Nanophotonic for All-Optical Networking Workshop (NAON Workshop)
- 2nd Conference on Graphs and Algorithms in Communication Networks (GRAAL Conference)

with special sessions on:

- Microresonators and Photonic Molecules (MPM): trapping, harnessing, and releasing light Novel Glasses for Photonic Devices
- Broadband Access: making use of optical transparency for user access

The number of ICTON participants has steadily increased from 87 in 1999 to 346 in 2007. At the same time, the number of conference contributions has increased from 70 in 1999 to 350 in 2007. Participants from as many as many as 48 countries have taken part in the ICTON conferences, some of them have come from very distant and exotic countries: 8 participants from Armenia, 15 from Australia, 6 from Brazil, 24 from Canada, 1 from Chile, 12 from China, 3 from India, 7 from Iran, 59 from Japan, 28 from Korea, 2 from Malaysia, 1 from Mexico, 1 from Morocco, 3 from New Zealand, 1 from Singapore, 2 from Taiwan, and 24 from USA.

In addition, the IEEE LEOS Poland Chapter was a technical sponsor of the International Conference MicroTherm'2007, "Thermal Problems in Electronics" in Lodz, Poland, June 24-28, 2007 and the 2007 ICTON Mediterranean Winter Conference in Sousse, Tunisia, December 6-8, 2007, a new satellite event to ICTON conferences, which brings ICTON and LEOS field of interest to this area.

More information may be found in http://phys.p.lodz.pl/leos

Biography:

Wlodzimierz Nakwaski, full professor in Physics since 1996, is a director of the Institute of Physics, Technical University of Lódz, Lódz, Poland. In

Membership Section (cont'd)

1996-2002 he has served as a Dean of the Faculty of the Technical Physics, Computer Science and Applied Mathematics. His research interest includes physical self-consistent modeling of an operation of opto-electronic devices, mostly semiconductor lasers, and optimization of their designs for various applications. He is an author or co-author of over 400 publications, 6 chapters in books and 2 books (*Semiconductor Lasers* (in Polish), PWN, Warsaw and *Physics of Semiconductor Lasers*, North Holland, Amsterdam) which have been more than 600 times quoted by other authors. For his scientific achievements, he has been 7 times awarded the Prize of the Minister of National Education. He is a Senior IEEE LEOS Member and has been in 2005-2007 a chairman of the IEEE LEOS Poland Chapter. In 1990-1998, he spent nearly six years at the Center for High Technology Materials, University of New Mexico, Albuquerque, USA, initially as a Research Senior Scientist and later as a Research Associate Professor. He is a co-editor of the Opto-Electronics Review. He is a nominator of the Kyoto Prize in Science and the Nobel Prize in Physics.

Professors Notomi and Nakwaski during a visit to the center of Lodz, the second greatest city of Poland.

FELLOW PROGRAM PRESENTATION IEEE CONFERENCES / MEETINGS

The IEEE Fellow Program was established to recognize and honor outstanding members for their significant accomplishments in the advancement or application of engineering, science, and technology and for their contributions to the mission of the IEEE. The IEEE Fellows form an elite group from all around the globe. They share the fact that they possess the highest possible membership grade.

The IEEE looks to the Fellows for guidance and leadership as the world of electrical and electronic technology continues to evolve. The grade of Fellow is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. The accomplishments honored have contributed importantly to the advancement or application of engineering, science, and technology, and have provided significant value to society. Election to the grade of Fellow occurs the year following approval by the Board of Directors conferring the honor. Members elected to the Fellow grade may use the title immediately following approval by the Board of Directors. All those elected receive a certificate and pin.

Nominator: Nominators need not be IEEE members. Furthermore, members who belong to the IEEE Board of Directors, Fellow Committee, Technical Society Fellow Evaluations Committee, or IEEE Staff are not eligible to be nominators. A nominee must be an IEEE Senior Member whose membership is current and who has completed five years of service in any grade of membership. Note: IEEE affiliate membership does not count towards the five-year threshold. The nominee can come from any field, including academia, government, and industry. He/she cannot be a member of the IEEE Board of Directors, Fellow Committee, Technical Society Fellow Evaluations Committee, or IEEE Staff. It is also important to note that a nominee may not self-nominate for consideration as a Fellow.

The nominator plays a major role in the Fellow Process, gathering enough information about the nominee to complete details of the nomination form, including a concise and accurate description of the technical contributions of the nominee such as awards, published papers, books, or patents. He/she must also present a proposed citation of no more than 20 words that describe the nominee's contributions. The nominator must also solicit at least five references who can provide detail as to the nominee's accomplishments. The nominator may opt to provide up to three endorsers to strengthen the nomination and contribute to the evaluation process. An endorser can be a person, IEEE Section, Chapter, Committee or Board to which the nominee has contributed time and talent. In addition, the nominator needs to identify the IEEE Technical Society or Council that best reflects the nominee's field of technical accomplishments. Finally, the nominator needs to submit the Nomination by the March 1 deadline.

Reference: A reference must be an IEEE Fellow whose membership is current. There are restrictions similar to those for a nominator in that he/she cannot belong to the IEEE Board of Directors, Fellow Committee, and Technical Society Fellow Evaluations Committee. Furthermore, neither a member of the IEEE Staff nor the nominator for that nominee is eligible to be a reference. The reference form is an important contribution to the IEEE Fellow Committee's decision whether to recommend a nominee to the IEEE Board of Directors for elevation to the grade of Fellow. References must cite specific evidence of the uniqueness and impact of at least one of the contributions of the nominee. Comments about the relative contributions by the nominee to any work attributed to more than the nominee, for example, if the nominee is a co-author of a listed work, are also very valuable. All References must be submitted on an IEEE Reference Form by the March 1 deadline.

Endorser: In some cases, the significance of a nominee's contributions and/or achievements may be best understood and evaluated by a recognized individual inside or outside the electrical and electronics engineering profession, who is not an IEEE Fellow or even an IEEE member. Any IEEE Section, Chapter, Committee, or Board to which the nominee has contributed time and talents, may endorse the nomination through its executive body. A non-IEEE organization or individual may also provide an endorsement. Similar exceptions exist as those for the nominee, nominator, and reference. Although an endorsement of a nominee is optional, the submission of such material will contribute to the evaluation process and should not be overlooked. An endorsement will strengthen a nomination if it contains information on specific contributions that, in the opinion of the endorsement, qualify the nominee for IEEE Fellow grade. All endorsements must be submitted on an IEEE Endorsement Form and received by that March 1 deadline.

Role of Technical Society/Council: The Technical Society/Council Fellow Evaluating Committee Chair must be an IEEE Fellow, but cannot be a nominator for any of the present cycle's nominees nor a reference or endorser for a nominee who will be evaluated in that Technical Society/Council. No IEEE Board of Directors member or IEEE Fellow Committee member may also serve as a Technical Society/Council Fellow Evaluating Committee Chair. The Technical Society/Council Fellow Evaluating Committee Chair also has an important role in the process. He/she must organize and chair a committee of experts with balanced backgrounds (research, teaching, design/development, technical management, manufacturing, etc.) to review IEEE Fellow grade nominations referred for evaluation. The Technical Society/Council Committees needs to be large enough to truly represent the composition of the Society in order to ensure that all individuals are receiving evaluations that adequately reflect the diversity of backgrounds and interests within a particular Technical Society/Council. The Society/Council evaluation is extremely important, because it is an impartial and even-handed view of the nominee's merit, by persons who are familiar with his or her work. In addition to the evaluation, the Technical Society/Council reviews copies of the endorsements as well as the original citation, having the opportunity to propose an enhanced one if necessary. Finally, they provide the Fellow Committee with scores for each nominee and ranks them accordingly.

Fellow Committee: In accordance with the IEEE Bylaws, the Fellow Committee is comprised of a Chair and not more than 52 members, all of whom shall hold the grade of Fellow. The committee shall be responsible to the Board of Directors, who shall appoint the members annually for one-year terms. Each of the Committee members judge, evaluate and rank almost 80 nominees each. They look at four major areas: individual contributions, Technical Society/Council evaluation, references, and endorsers, in addition to the professional activities of the nominee. Total years in the profession are also considered.

Nominee Individual Contribution: The Individual Contribution of a nominee is a major part of the evalu-

Membership Section (cont'd)

ation process, and refers to the attributes and level of involvement in the key activities associated with each of the Categories as described here:

- Application Engineer/Practitioner: Responsible for product development, advancement in system, application or operation, project management or construction activity, process development, manufacturing innovation, codes or standards development, or other application of technology. For the most part, nominees in this category are found in industry
- Educator: Responsible for advancing electrical engineering and scientific technology through education by the developing curricula and/or courses that are innovative and unique
- Research Engineer/Scientist: Responsible for inventions, discoveries or advances in the state of the art technological advances
- Technical Leader: Responsible for a managerial, team, or company-wide effort using technical innovation, and resulting in outstanding performance, economic enhancements, or other advantages to benefit society

It should be noted here that even though nominations have been accepted for the newest Fellow category (Application Engineer/Practitioner) for nearly three years, the number of Fellows in this group is surprisingly low. Out of the 295 Fellows named for the Class of 2008, 20 were from the practitioner group compared to the 15 in the 268 member Class of 2007.

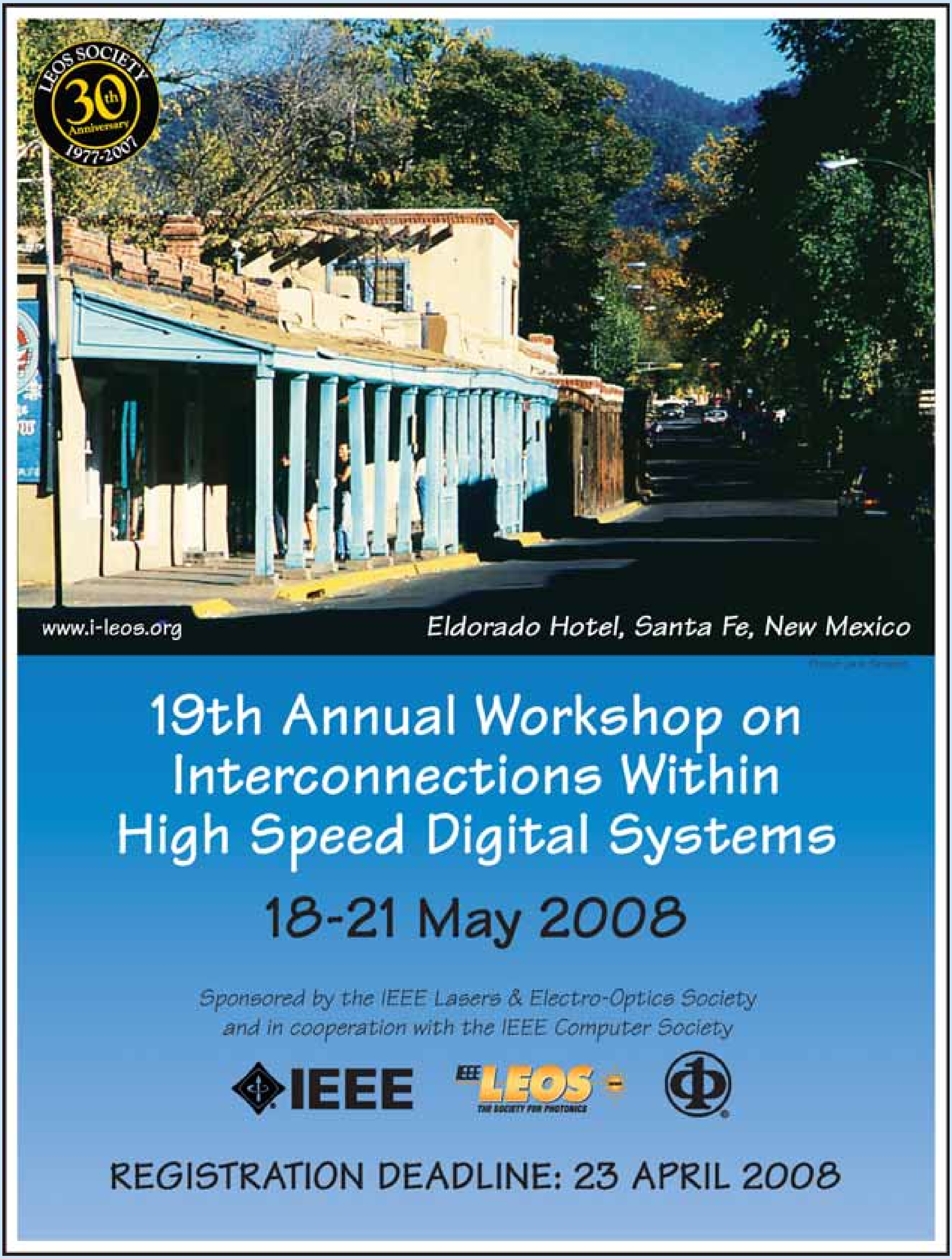
One reason for this low number might be that nominators are still unsure about the type of work that would qualify someone for this category. Many nominators are checking off the Research Engineer/Scientist box on the nomination form when perhaps they should be marking the Application Engineer/Practitioner category. The position of some nominees is identified to be that of a research scientist or engineer, but the work for which they are being cited could be considered that of a practitioner. There were 225 Fellows from the scientist group in the 2008 class.

Role of the Fellow Committee: The fifty-two members are divided into nomination evaluation groups and each of these groups evaluates an equal portion of the nominees under consideration. As mentioned earlier, the norm is about 80 per group. The criteria mentioned earlier – Individual Contributions / Evidence of Technical Accomplishment, Technical Society/Council Evaluation, References / Endorsements and Professional Activities – are evaluated and scored. The IEEE Bylaws specify that the maximum number of Fellows that may be elected in any year is one tenth of one percent of the voting membership. The Committee determines that number through the scoring/ranking process.

Milestone Dates: The milestone dates for the Fellows Program are listed below. It should be noted that these dates are firm, so as to provide appropriate time for each portion of the cycle and maintain the integrity of the Program.

Contributor	Activity	Deadline Date
Nominator	Nomination Form	March 1
Reference	Reference Form	March 1
Endorsement	Endorsement Form	March 1
Society/Council Chair	Submit Scores	June 15
Fellow Committee	Final Review	Late September
Board of Directors	Approve Slate	November

The Fellow Activities Staff and Fellow Committee are ready to respond in a timely fashion to any questions, issues, and concerns that all interested parties may have. Details about the program and the nomination process may be found at http://www.ieee.org/fellows. The Fellow Staff may be reached via email at fellows@ieee.org.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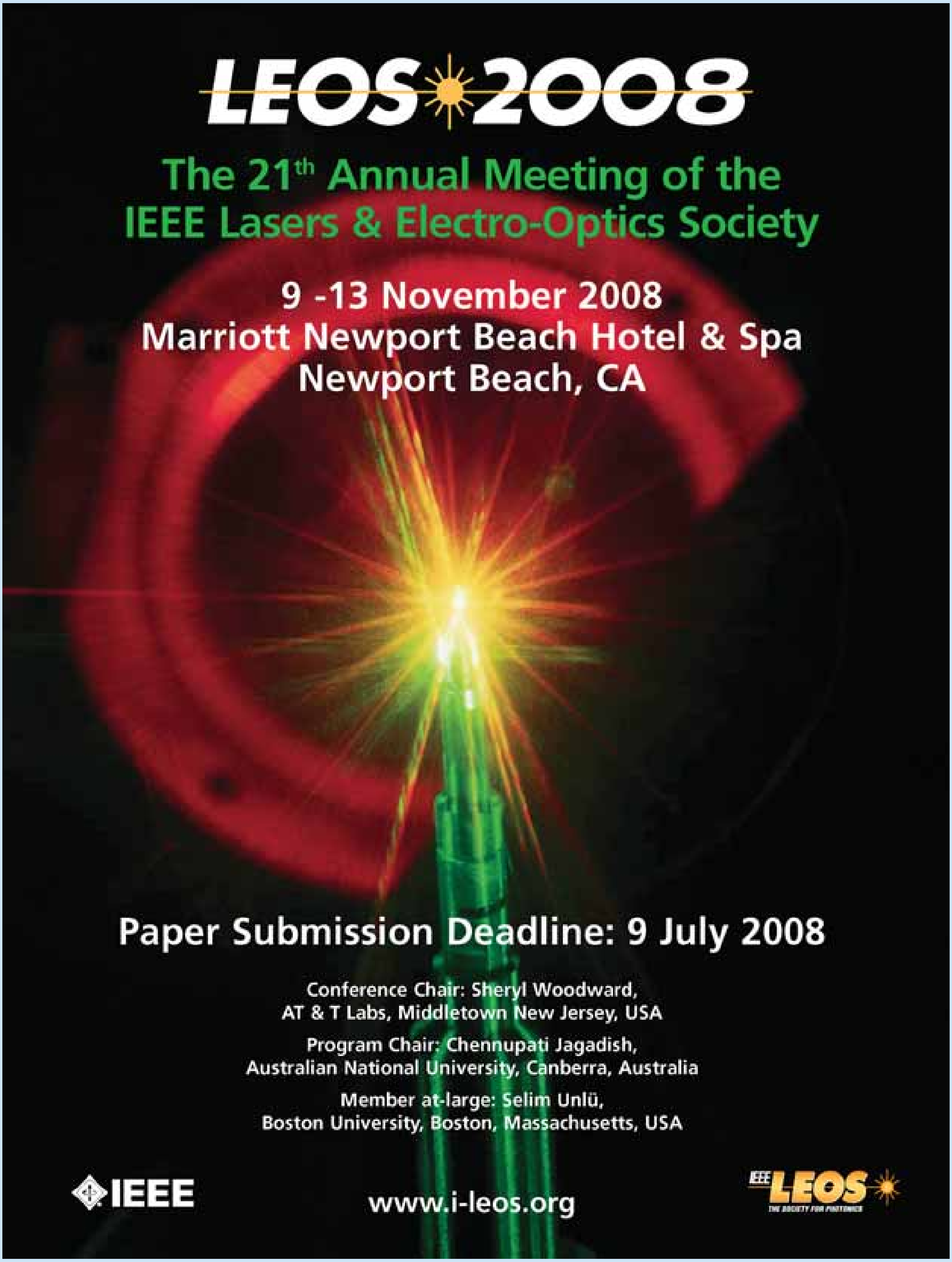
LEOS 2008
The 21th Annual Meeting of the
IEEE Lasers & Electro-Optics Society
9 -13 November 2008
Marriott Newport Beach Hotel & Spa
Newport Beach, CA
Paper Submission Deadline: 9 July 2008
Conference Chair: Sheryl Woodward,
AT & T Labs, Middletown New Jersey, USA
Program Chair: Chennupati Jagadish,
Australian National University, Canberra, Australia
Member at-large: Selim Unlü,
Boston University, Boston, Massachusetts, USA
IEEE
www.i-leos.org
IEEE LEOS

Call for Papers

Announcing a Special Issue of the IEEE/OSA Journal of Display Technology for Flexible Electronics and Display

Submission Deadline: 31 March 2008

The IEEE/OSA Journal of Display Technology (JDT) invites manuscript submissions for a special issue covering the Flexible Electronics and Display. The purpose of this special issue is to document the latest frontiers in fundamental research and technological development of flexible electronics and displays. The scope of this special issue covers but not limited to Flexible Thin Film Transistors, Organic photovoltaic and sensors, Materials and process of Organic Light-Emitting Diodes, and other flexible display technologies. All submissions will be reviewed in accordance with the normal procedures of the Journal.

The Primary Guest Editors for this issue is Professor Hsin-Lung Chen, National Tsing Hua University, Taiwan and Dr. Jack Hou, Industrial Technology Research Institute, Taiwan. Associate Guest Editors are Professor Iain McCulloch, Imperial College, UK, Professor Gregory Raupp, Arizona State University and Professor Vivek Subramanian, University of California Berkeley.

The deadline for submission of manuscripts is 31 March 2008 and publication is tentatively scheduled for the September 2008 issue. Manuscripts should conform to requirements for regular papers (up to 8 double-column, single-spaced journal pages in length, keywords, biographies, etc.). The IEEE Copyright Form should be submitted after acceptance. The form will appear online in the Author Center in Manuscript Central after an acceptance decision has been rendered.

For all papers published in JDT, there are voluntary page charges of $110.00 per page for each page up to eight pages. Invited papers can be twelve pages in length before overlength page charges of $220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper.

Authors may opt to have figures displayed in color on IEEE Xplore at no extra cost, even if they are printed in black and white in the hardcopy edition. Additional charges will apply if figures appear in color in the hardcopy edition of the Journal.

Manuscripts should be submitted electronically through IEEE's Manuscript Central:

http://mc.manuscriptcentral.com/leos-ieee. Be sure to select "Special Issue" as the Manuscript Type, rather than "Original Paper." This will ensure that your paper is directed to the special issue editors. IEEE Tools for Authors are available online at: http://www.ieee.org/organizations/pubs/transactions/information.htm

Inquiries can be directed to Lisa Jess, Publications Administrative Assistant, IEEE LEOS Editorial Office, l.jess@ieee.org (phone +1-732-465-6617; fax +1 732 981 1138).

ADVERTISER'S INDEX

LEOS Mission Statement

LEOS shall advance the interests of its members and the laser, optoelectronics, and photonics professional community by:

- providing opportunities for information exchange, continuing education, and professional growth;
- publishing journals, sponsoring conferences, and supporting local chapter and student activities;
- formally recognizing the professional contributions of members;
- representing the laser, optoelectronics, and photonics community and serving as its advocate within the IEEE, the broader scientific and technical community, and society at large.

LEOS Field of Interest

The Field of Interest of the Society shall be lasers, optical devices, optical fibers, and associated lightwave technology and their applications in systems and subsystems in which quantum electronic devices are key elements. The Society is concerned with the research, development, design, manufacture, and applications of materials, devices and systems, and with the various scientific and technological activities which contribute to the useful expansion of the field of quantum electronics and applications.

The Society shall aid in promoting close cooperation with other IEEE groups and societies in the form of joint publications, sponsorship of meetings, and other forms of information exchange. Appropriate cooperative efforts will also be undertaken with non-IEEE societies.

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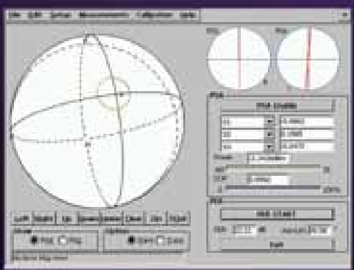
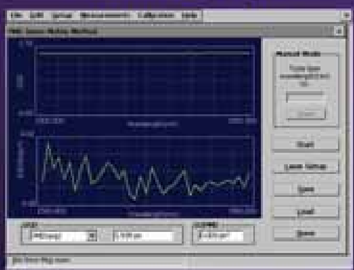


PER measurement



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