



VIRGINIA MOUNTAIN SECTION NEWSLETTER

IEEE Region 3, Council 9, Section 65

January 2002

Thursday, January 17

Annual Student Paper Competition

Effect of a Retro-Reflector on Polarization

Michele Suite - Va. Tech.

Electronic Aperture Design

Arshia Cont - Va. Tech.

Endovascular Balloon Catheter Pressure Sensor

Stephen F. Lee Jr. and Matthew R. Brooks - VMI

Installation and Characterization of a Four-Tube Oxidation-Diffusion Furnace

Erkin Şeker - Va. Tech.

The JEDI Nite – Sensing and Tracking “Whatever’s Out There”

Caleb Sylvester and Brian Meadowcroft - VMI

Measurement of Acoustic Radiation Pattern in an Acousto-Optic Modulator

Dennis Gies - Va. Tech.

More than ever, the papers in this year’s contest include a diverse range of subject matter. Practically all members should find something of interest here.

Join us at the Clarion.

Our sincere thanks to all the students for participating. We wish you luck in the competition, and hope you will continue and present your paper at the next SouthEastCon.

Note, we will be starting the talks 15 minutes earlier than usual and plan to run till 9:15 to gain a ½ hour for the speakers.

Reservations

Date: Thursday Jan. 17, 2002
Social: 6:30 PM
Dinner: 7:00 PM
Talks: 7:45 PM

Cost: Member or Guest \$15.00
Student \$ 8.00

Clarion Hotel Roanoke Airport

2727 Ferndale Drive NW
1581 Exit 3 Hershberger Rd West
1st Rt. onto Ordway Drive,
¼ mile, Rt. Into Parking Lot.

Reserve by **5 PM Monday** Jan. 14
Call

Mark Shepard (540) 387-8710
or e-mail

msheward@ieee.org

Please specify number of attendees.

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Chairman's Chat Room

As we embark on the New Year and I become your Chairman, I wish to thank you and the Virginia Mountain Section Year 2001 Officers, Executive Committee Members, Chapter Chairmen, Newsletter Editor, and Committee Heads for their past year's dedication and energy. IEEE is a volunteer organization, and as you can see, it functions successfully due to the commitment of many individuals. I am looking forward to working with you and all the newly elected officers to grow the Virginia Mountain Section and generate further interest among the members.

I want to stress heightened participation as the key area of emphasis during 2002. Participation by all our constituencies - industrial, academic, student, and retired - is vital. Participation can take many forms as in meeting attendance, chapter activities, presentations, and suggestions/inputs to the current Officers. Please feel free to offer your thoughts to me (mmoses@ieee.org) on any topic which will make the VMS more relevant to you including meeting locations, presentation subjects, and work related issues. I am going to ask our new Executive Committee to do the same.

This month focuses on student participation and the opportunity to highlight IEEE college chapters. Come on out and learn about student R&D activities. I am sure you will be interested and impressed. In the meantime, a Happy, Safe and Prosperous New Year to you and our country.

See you January 17th.

Howard J. Moses

VMS Election Results

Member participation was the largest in at least a decade. See Dan Jackson's Tellers Report below.

Results are:

Chairman:

Howard Moses
63 Votes

Vice Chairman:

Mark Shepard
63 Votes
Dan Jackson

1 Vote (write in)

Secretary Treasurer:

Shawn Addington
62 Votes

Industry Applications Chair:

Cy Harbourt
16 Votes

Microwave Theory & Techniques /

Electron Devices Chair:

Dain Miller
4 Votes

Industrial Electronics / Computer / Control
Systems Chair:

David Geer
18 Votes

Executive Committee Members At Large:

(1st four elected)

David Livingston
55 Votes

Ira Jacobs
55 Votes

William Tranter
47 Votes

John Fennick
44 Votes

Jim Squire
43 Votes

Congratulations to the winners and a most appreciative thank-you to all who ran.

...*editor*

Tellers Report

My thanks to Dave Kingma and Heath Kouns for assisting in the ballot count and certifying the results. Also, my thanks to all the members of the Virginia Mountain Section who voted.

There were 66 votes cast, 14.7 percent of the voting membership. This is considerably better than last year when only 45 members voted. Your vote does count and it does make a difference. I look forward to seeing many of you at the Section meetings during the year.

Dan Jackson,
Chair, Tellers Committee

New Section Members

This past two months two IEEE members joined us in the VMS area.
A warm welcome to:

Joseph Neil Noronha

Blacksburg

William Horth

Vinton

Howard Moses has sent his personal welcome to each and we look forward to greeting you at our Section or Chapter meetings.

...*Editor*

Abstracts

The Effect of a Retro-Reflector on Polarization

Retro-reflectors are used in many optical systems in which polarization control is vital, such as quantum cryptography and satellite laser ranging. In quantum cryptography, more specifically quantum key distribution, information is contained in the polarization of a received photon. For satellite laser ranging, laser pulses reflected from retro-reflectors typically return to the same telescope used for transmission. Polarization sensitive optics are then used to separate out the return. Any change in polarization induced by a retro-reflector is therefore of great importance. In this paper the effects of a corner-cube and hollow retro-reflector on polarization are examined. The experimental results are compared to theoretical predictions and conclusions about the effects of retro-reflectors in polarization sensitive optical systems are drawn.

Electronic Aperture Design

An Electronic Aperture was designed to turn current On and Off in a vacuum-tube diode. The model used is very similar to the electric gun in the vacuum tube of a TV set. The aperture is modeled as a 2-D box in which the voltages on the sides range from 0 to 910 volts. We are to choose some of the voltages in between so that the electrons are guided in the desired manner for both Full current and Cut-Off cases. A MATLAB program is used to solve the Laplace equation using the method of Finite Relaxation which also gives out 2-D and 3-D figures for equipotential surfaces using the solved equation. The challenge of the design is to come up with boundary voltages for both Full current and Cut-Off situation which give smaller maximum electric fields between the plates to

minimize the risk of a breakdown, and also to minimize the voltage change of the changing plates between the two conditions.

Endovascular Balloon Catheter Pressure Sensor

Atherosclerosis, a form of heart disease in which arteries narrow, is a leading concern of doctors and physicians worldwide. It can be corrected by a procedure known as angioplasty and stenting, but placing the stent requires great skills and some guesswork. If over-expanded, stents that hold open clogged arteries can actually injure the arterial wall, causing an uncontrolled healing response by the artery which worsens the arterial blockage. Working with a patent prototype held by Maj. James C. Squire, a sensor is developed on the basis of a capacitor to sense pressure between the stent and the artery. Computer software is then incorporated into the sensor to display and record the real-time pressure data using a laptop computer.

Installation and Characterization of a Four-Tube Oxidation-Diffusion Furnace

This research project was to install and characterize a four-tube oxidation-diffusion furnace in a cleanroom. The necessary quartzware including a wafer boat, pull rod, and white elephant were designed and ordered. For cleaning the quartz tubes, two polypropylene baths were built. The wet and dry oxidation tubes were characterized. The data acquired included oxide thickness, refraction index and oxide uniformity. Following a statistical analysis, oxide thickness curves with error bounds of 95% confidence level were produced. Additionally, linear and parabolic growth rate constants were calculated.

The JEDI Nite – Sensing and Tracking “Whatever’s Out There”

The JEDI Nite system is a sensory system that demonstrates the compatibility of three specific sensors, a datalogger and its associated display and storage software, and a common laptop computer. Three sensors – RF sensor, E/H sensor, and radiation sensor – feed to a 4-input analog

datalogger and an RS-232 connection delivers the sensors’ findings to the laptop computer. The datalogger software makes possible the real-time display and storage of all three sensor’s data on the laptop computer, so personnel monitoring the system on-site may immediately recognize environmental changes or the stored data may be reviewed after the system has operated by itself for some period of time. The entire system operates independently for at least 24 hours.

The finalized JEDI Nite demonstrates the utility of such a stand-alone detection device and establishes the validity of a portable, independently operating sensory stack in the field of detecting and defending against nuclear, biological, and chemical agents.

Measurement of Acoustic Radiation Pattern in an Acousto-Optic Modulator

The acousto-optic modulator (AOM) consists of a small block of crystal or glass to which a piezo-electric transducer is bonded. An interesting feature of the AOM is the ability to deflect a coherent light beam proportional to the intensity of the radiation pattern of the transducer. Verifying this behavior experimentally, however, can prove challenging due to the extreme accuracy necessary for measuring angles of rotation. A new and effective method of capturing the radiation pattern experimentally from measurements of the first-order diffracted light intensity is described. This method has the benefit of not requiring expensive devices to determine the angle at which the coherent light beam is incident upon the AOM. monitoring the system on-site may immediately recognize environmental changes or the stored data may be reviewed after the system has operated by itself for some period of time. The entire system operates independently for at least 24 hours.

The finalized JEDI Nite demonstrates the utility of such a stand-alone detection device and establishes the validity of a portable, independently operating sensory stack in the field of detecting and defending against nuclear, biological, and chemical agents.

Update your IEEE Record

The IEEE will accept updates from volunteers (Officers, editors) and we occasionally note discrepancies, in say, e-mail addresses, and send corrections. However, this is a slip-shod method at best and IEEE’s general policy is that the member is responsible for his or her own information. Each month when creating address labels and updating local records with new data from Headquarters, we notice numerous obvious errors in the data base e.g., area code 703.

When did you last update your records at IEEE? Have you moved, changed phone number, e-mail address (most common) ? Please take a moment to reflect and then act if need be.

There are many ways to correct member information:

- There is a web based interactive “change of address” form at:

<http://services1.ieee.org/membersvc/coa/intro.htm>

- You can send an e-mail message to:

<mailto:address-changes@ieee.org>.

- Call IEEE Member Services at 1-800-678-IEEE (1-800-678-4333)

- Mail changes to: IEEE 445 Hoes Lane PO Box 1331 Piscataway, NJ 08855-1331 USA

- Fax your changes to: 1-732-981-9667

- Your Web Site - Take a Look

The VMS web site,

<http://www.ewh.ieee.org/r3/virginia-mountain/>

has a wealth of information about the Section and the IEEE not generally available through other sources. It is also an easy way to access other IEEE National or Region Sites and services.

Your feedback and input is always welcome. Send it to me: [editor](#)

2001-2002 MEETING SCHEDULE

DATE	SPEAKER/TOPIC	MEETING PLACE
September 20 Spouses' Night, 2001	M. von Spakovsky Fuel Cell Technology	Clarion Hotel Roanoke
October 18* (Joint MTTD)	Louis J. Guido Semiconductor LEDs and Lasers: Past, Present, and Future	Clarion Hotel Roanoke
November 15	T. Rappaport Trends in Wireless Communications	Clarion Hotel Roanoke
January 17	Student Paper Competition	Clarion Hotel Roanoke
February 21	Kumar Krishen New Technology Innovations for Space Applications	Clarion Hotel Roanoke
March 21 Spouses' Night, 2002*	Robert Trew Technology Future Directions	Clarion Hotel Roanoke
April 18	Otto Szentisi Fiber Optic Network Development	Clarion Hotel Roanoke
May 16	Plant Tour	TBD

* Changed

IEEE Virginia Mountain Section

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NEWSLETTER

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Anyone may submit material for the Newsletter

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