Polarization

Dennis Goldstein, FELLOW SPIE
U.S. Air Force Research Laboratory
AFRL/MNGI
101 West Eglin Boulevard, Suite 280
Eglin Air Force Base, Florida 32542

J. Scott Tyo, MEMBER SPIE
University of New Mexico
Electrical and Computer Engineering Department
Albuquerque, New Mexico 87131

David Chenault
SY Technology, Inc.
654 Discovery Drive
Huntsville, Alabama 35806

It has been over 5 years since the last special section on polarization appeared in *Optical Engineering*. In the intervening years, there has been tremendous progress and a strong resurgent interest in polarization in remote sensing, phenomenology, and devices. Military applications have driven much of the interest in remote sensing and phenomenology, while commercial interests, particularly in the area of telecommunications, have driven development of devices and new metrology capability. These requirements have demanded new instrumentation, new theories, and population of phenomenology databases. Tremendous capability in instrumentation has resulted over the last decade due to cheaper and more capable opto-electronics and cheaper and far more powerful computing power. The increased computing power has enabled the sophisticated data reduction and calibration that is required when making polarimetric measurements. The new instrumentation, which has been used to better understand the phenomenology associated with light in nature and in optical systems, has enabled better understanding and experimental verification of theories and models.

This special section encompasses the breadth of polarization. The 16 papers of the special section can be broadly grouped into four categories: instrumentation, analysis, measurements, and instrumental polarization. Six papers on instrumentation range from non-imaging spectral instruments to imaging instruments to polarization simulators covering the spectrum from the visible to the long wave infrared. Two papers refine polarization effects in instrumentation and describe instrumental polarization analytically and experimentally. Five analytical papers cover many areas of concern to people working in the area of polarization, particularly with regard to scattering theory, optimizing Mueller matrix measurements, and noise effects in polarimetric systems. Finally, three papers cover measurements including detection, discrimination, and phenomenology.

Interest in polarization continues to grow. Biannual polarization conferences at SPIE have recently become annual conferences. SPIE conferences on polarization now include Vol. 891 held in 1988, Vol. 1166 in 1989, Vol. 1317 in 1990, Vol. 1746 in 1992, and Vol. 2265 in 1994. Recent conferences are documented in Vol. 3121 (1997), Vol. 3754 (1999), Vol. 4133 (2000), and Vol. 4481 (2001). Many of the papers in this special section are updated versions of work documented in these proceedings. An SPIE-sponsored Polarization Technical Group was formed in 1999 and continues to grow with annual meetings, a web site, and a discussion forum. Polarization has also garnered interest in other conferences including IEEE, OSA, and Military Sensing Symposia (MSS).

Acknowledgments

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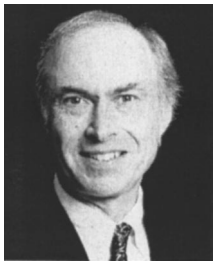
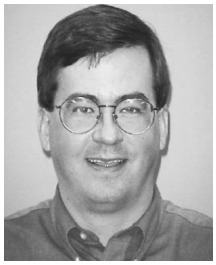


Dennis Goldstein obtained his BS and MS degrees from the University of Wisconsin–Madison and his PhD in physics from the University of Alabama in Huntsville. His research interests include optical processing, polarized light, and electro-optic modulators, and he has five patents in these areas. He currently leads the optical processing and polarization activities in the Advanced Guidance Division of the Air Force Research Laboratory. He was 2000-2001 President of the Emerald Coast Optical Society (a local section of the Optical Society of America), is 2000-2002 Chairman of the Polarization Technical Group of SPIE, and has chaired six SPIE conferences on polarization. He is an adjunct assistant professor in the Electrical Engineering Department of the University of Florida, and is a member of the University of Florida Graduate Engineering Research Center Advisory Council. He is accredited as a National Research Council Research Adviser and is a fellow of SPIE.

J. Scott Tyo received the BSE, MSE, and PhD degrees in electrical engineering from the University of Pennsylvania in 1994, 1996, and 1997, respectively. From 1994 to 2001, he was an officer in the US Air Force, achieving the rank of Captain. While in the Air Force he seved tours as a research engineer ar the Air Force Research Lab/Directed Energy Directorate in Albuquerque, New Mexico, and as an assistant professor at the Naval Postgraduate School in Monterey, California. In 2001 he joined the faculty of the Electrical and Computer Engineering Department at the University of New Mexico (UNM) in Albuquerque where he is a member of the Applied Electromagnetics Research Group. His research interests at UNM include the development of sensors, antennas, and measurement systems for optical and microwave remote sensing. He has been active in the field of polarimeter modeling and optimization for the past several years. Dr. Tyo is a member of SPIE, OSA, IEEE, and URSI Commissions B & E. He serves as a reviewer for several journals that focus on electromagnetic propagation and remote sensing, and has served on the program committees of the Polarization: Measurement, Analysis, and Remote Sensing symposia sponsored by SPIE. Dr. Tyo was awarded an URSI Commission B Young Scientists Award and is a member of Tau Beta Pi and Eta Kappa Nu.



David B. Chenault is currently the director of the Optical Systems and Technology Group with SY Technology, a division of L-3 Communications, where he is managing a variety of optical instrumentation development programs. He has developed a spectropolarimeter, several imaging polarimeters, and several nonimaging polarimeters across the optical spectrum along with data reduction and calibration routines to support them. He has served as SPIE co-chair of the polarization in remote sensing conferences over the last several years as well as in local sections of OSA and SPIE. Dr. Chenault received his BS in physics from Vanderbilt University in 1986, his MS in physics from the University of Alabama in Huntsville in 1989, and his PhD in physics from the University of Alabama in Huntsville in 1992.