Acousto-Optics

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When I traveled to Poland and the former Soviet Union several years ago to attend the 4th Spring School on Acousto-Optics and Applications at the University of Gdansk, and the Leningrad International Workshop on Acousto-Optics, I noticed that the Western participants generally concurred that Soviet scientists and engineers know much more about the research being done in the United States than U.S. scientists and engineers know of the work of their Soviet counterparts. In particular, I noted that a Russian professor listed numerous U.S. references in his books. On the other hand, U.S. scholars seldom cite Soviet references. Furthermore, this same Russian professor seemed to be known throughout Eastern Europe, but was virtually unknown to the U.S. scientists and engineers attending the conferences.

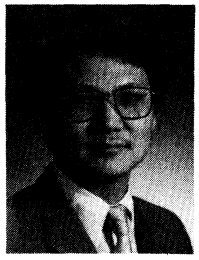
It appears to be common practice at Russian universities for student assistants or research associates to serve as translators. Thus, paper searches are not hampered by language problems and, therefore, Eastern Europeans have access to a larger selection of reference materials.

This special section focuses on all aspects of research on acousto-optic effects and devices as well as their signal and image processing applications. It includes contributions from the scientists and engineers who attended the conferences in Poland and Leningrad. The first three articles are review papers: "Theoretical acousto-optics in Belgium" by Leroy and Mertens, "Acousto-optics in Poland" by Śliwiński, and "Acousto-optics in the CIS" by Kulakov and Molotok. The paper by Kulakov and Molotok cites numerous contributions from the scholars of the former Soviet Union. I urge the readers to look into some of the citations that may be relevant to their own research. Also, I have two more CIS papers currently being reviewed, and I ask the interested readers to look for them in forthcoming issues of *Optical Engineering*.

The next four papers deal with acousto-optic interactions. The paper by Korpel presents the results of computer simulations concerning light interaction with strongly curved wave fronts of sound. Results on the investigation of close to collinear acousto-optical interaction in paratellurite single crystals are presented in the paper by Voloshinov. Banerjee, Tarn, and Liu investigate acousto-optic Bragg interaction between an optical beam with arbitrary profile and contrapropagating sound beams. Carbon and Parygin solve the Bragg diffraction problem for light incident on a rectangular acoustic column in the weak interaction regime. The eighth paper by Gottlieb, Goutzoulis, and Singh discusses high-performance acousto-optic materials.

The last six papers deal with the many applications of acousto-optics. Suhre et al. discuss the spatial resolution limit of nonlinear acousto-optic tunable filters used for imaging with incoherent light. Blomme and Leroy present an acousto-optic reconstruction technique that can be used to reconstruct the sound wave from the scattered optical signal. Blatt et al. discuss the application of acousto-optic cells and video processing to achieve signal-to-noise improvements in moiré profilometry. Sadler, Giannakis, and Smith discuss acousto-optic estimation of correlations and spectra using triple correlations and bispectra. This is followed by a paper by Pape who discusses the design, performance, and applications of multichannel Bragg cells. The final paper in this group, by Indebetouw and Poon, reviews novel approaches of incoherent image processing. More specifically, methods for performing bipolar incoherent spatial filtering using an acousto-optic approach are discussed.

I hope this special section will stimulate further research in acousto-optics and its various applications. I expect a lot more interesting and exciting research in this area to come. A special section like this would not be possible without the help of many people. First, I would like to thank the editorial staff at *Optical Engineering* for their support and Editor Brian J. Thompson for providing this opportunity. Finally, I would like to acknowledge the help of the reviewers for their prompt responses and many helpful comments and suggestions. They played a vital role in this special section. They are A. L. Abbott, P. P. Banerjee, K. R. Baker, I. M. Besieris, M. R. Chatterjee, V. Chen, M. Gottlieb, G. Indebetouw, A. Korpel, E. N. Leith, A. W. Lohmann, J. N. Mait, W. G. Mayer, D. J. Moore, W. A. Penn, R. J. Pieper, D. N. Sitter, Jr., A. VanderLugt, and E. Young.



Ting-Chung Poon received the BA degree in physics and mathematical sciences in 1977 from the University of Iowa, Iowa City, and the MS and PhD degrees in electrical and computer engineering at the same university in 1979 and 1982, respectively. He was on the faculty of the Department of Electrical and Computer Engineering at the University of Iowa from 1982 to 1983. Currently, he is an associate professor of electrical engineering at Virginia Polytechnic Institute and State University. His research interests include acousto-optics, hybrid (optical/electronic) image processing, hybrid bistable devices, and optical scanning holography. Dr. Poon is a member of the OSA and SPIE and a senior member of the IEEE.