Tutorial Speaker	
Full Name	René-Jean Essiambre
Affiliation	Bell Labs, Nokia
Presentation Title	Propagation effects in fibers supporting multiple spatial modes

Biography

René-Jean Essiambre received his Ph.D. in Physics from Laval University, Québec City, Canada and pursued post-doctoral studies at the Institute of Optics of the University of Rochester, Rochester, NY. In 1997, he joined Lucent Technologies (which became Alcatel-Lucent and now Nokia). Dr. Essiambre worked on fiber lasers, optical fiber nonlinearity, advanced modulation formats, coherent detection, space-division multiplexing and information theory applied to optical fibers. He has an extensive knowledge of fiber-optic communication systems and contributed to the design of many installed commercial systems. He has served on or chaired several conference committees, including OFC, ECOC, CLEO and the IEEE Photonics Society (IPS). He was program and general co-chair of CLEO Science & Innovation in 2012 and 2014, respectively. He is a recipient of the 2005 Engineering Excellence Award from OSA, a fellow of the IEEE and the OSA, and a Distinguished Member of Technical Staff (DMTS) at Bell Labs, Nokia. He is also a fellow of the Institute of Advanced Studies of Technical University of Munich (IAS-TUM) in Munich, Germany. He is currently member of the Board of Governors and V-P of the Membership Council at IPS.

200 words abstract

Optical fibers supporting multiple spatial modes have promising applications such as in wavelength conversion, supercontinuum generation and information transport using multiple fiber modes. This tutorial will focus mainly on propagation over two types of fibers - multimode and coupled-core fibers. We will first describe the various nonlinear interactions present between modes in fibers supporting multiple spatial modes, paying particular attention to the phenomenon of intermodal four-wave mixing. The second part of the presentation will address space-division multiplexing. We will present the averaged nonlinear equations of propagation over multiple fiber modes, where the averaging is performed over all possible realizations of random linear mode coupling along the fiber length. Such random linear coupling is a phenomenon present in most transmission fibers exceeding a few hundreds of meters in length. We will then show how these averaged propagation equations, often referred to as generalized Manakov equations, can be obtained by extending the derivation done for single-mode fibers to multimode and coupled-core multicore fibers. Finally, some interesting behaviors observed in relation to the propagation equations will be discussed.