EuroSciCon

EuroSciCon Joint Event on

Laser Optics & Photonics and Atomic & Plasma Science

July 16-17, 2018
Prague, Czech Republic

G Katz et al., Am J Compt Sci Inform Technol 2018, Volume 6
DOI: 10.21767/2349-3917-C1-002

ANALYTICAL COMMUTATION OF ELECTRICAL EQUALIZER IN ON-OFF-KEYING OPTICAL COMMUNICATION SYSTEMS

G Katz and D Sadot

[1]Holon Institute of Technology, Israel
[2]Ben-Gurion University of the Negev, Israel

Chromatic dispersion is a critical factor that limits the quality of the received optical signal in high speed fiber optic communication systems. Chromatic dispersion introduces pulse broadening of transmitted signal and occurs due to the propagation delay variance of different spectral components of the transmitted signal. In order to minimize the performance degradation caused by pulse distortion and broadening, dispersion compensation is needed. Electrical dispersion compensation equalizer is a key and cost-effective element in optical communication systems in the presence of chromatic dispersion. The equalizer coefficients can be calculated or estimated adaptively according to an optimization criterion. There are two common optimization criteria, the zero forcing and minimum mean square error (MSE), where the latter is found to be more useful as it considers the noise enhancement. For the MSE criterion the equalizer coefficients can be estimated adaptively using the least mean square (LMS) method or analytically calculated using Wiener solution. In most researches of optical communication systems, the equalizer coefficients were estimated adaptively by using the LMS method. Here, an analytical solution is established for the electrical equalizer coefficients in on-off-keying optical communication systems. The solution is based on minimum MSE. The analytical results show a perfect match with computer simulation. In addition BER performance comparison with the adaptive LMS method reveals that the analytical solution performs better due to LMS excess MSE.

Biography

G Katz received his PhD degree in Electrical and Computer Engineering from Ben Gurion University in Israel in 2006. In 2000 he finished his MA on the subject of optical coherent multiplexing CDMA. From 2000-2003, he worked as Electrical Engineer in the Free Space Optics Field, developing a sophisticated laser transmitter and optical receiver. In his PhD during 2003- 2006, he has investigated electrical digital signal processing (DSP) techniques to mitigate intersymbol interference (ISI) effect in optical communication systems. This research led to a startup company in 2006, MultiPhy which today is a leading company that develops the next generation ICs at 100Gbps and 400Gbps for fiber optic networks. From 2016, he conducts his research and functions as a Lecturer at Holon Institute Technology, Israel. He has published more than 20 papers on subjects as DSP for optical communication systems, DSP for free space optics and more.

giladka@hit.ac.il