Noise Evolution in Lossy Nonlinear Dispersive Fiber Systems
by
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The Chinese University of Hong Kong

Abstract
Noise accumulation due to linear and nonlinear effects is the major cause of performance degradation in current optical fiber communication systems. In this talk, both intra- and inter-channel noise evolution in lossy nonlinear dispersive optical fibers are discussed with stress in physical mechanism rather than complicated mathematical derivation.

The results are expressed in a 2x2 transfer matrix, which links between the input and output weak intensity and phase modulations or noise. Each matrix element has very clear physical meaning. For instance, it becomes quite easy to understand modulation instability and noise evolution in systems using dispersion compensation and Raman amplification, etc. The results can be applied to characterize system performance such as electrical SNR (related to intensity noise at the receiver), equivalent linewidth (related to phase noise at the receiver) and optical field noise (related to optical SNR measured by optical spectrum analyzer).

Transfer matrices are also derived to simultaneously characterize XPM- and SRS-induced crosstalk noise as well as their interplay in WDM systems. It is found that in WDM IM/DD systems, SRS-induced crosstalk may even exceed that from XPM in some cases, and the “resonance effect” caused by complete dispersion compensation is much more profound by SRS compared with XPM.

Biography
Chongcheng Fan was graduated from the Radio Engineering Department of Tsinghua University, Beijing, China in 1958. Then he joined the faculty and engaged in teaching and research related to Microwave Electronics until 1979, when he switched to Guided-wave Optics. From 1989 to 1991, he was a visiting research scientist at Rutgers University and worked with Professor E. Snitzer on EDFA design optimization, and is currently a professor of the Electronics Engineering Department of Tsinghua University, Beijing, China. His current research interest includes DWDM systems and networking, static/transient performance of optical amplifiers, fiber nonlinearities, dispersion management and fiber gratings, etc. He has been engaged in many research projects as the principal investigator sponsored by the State Commission of Science and Technology, the NSF of China and the Ministry of Information Industry, etc. Professor Fan has authored more than 100 journal papers and conference presentations, holds 4 patents and received several awards. He also serves as the Vice Chairman of the Professional Committee on Optical Communications of the China Institute of Communications, and is a Fellow of OSA.

** ALL ARE WELCOME **

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