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Jochen Leibrich

**Modeling and Simulation of Limiting Impairments
on Next Generation's Transparent Optical WDM
Transmission Systems with
Advanced Modulation Formats**

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Internet: www.shaker.de • e-mail: info@shaker.de

Abstract

Next generation's fiber optic transmission systems show significant differences towards those systems currently existing, mainly in terms of higher optical transparent length. This trend, which is driven by economical reasons, pushes next generation's systems closer towards physical limits.

Consequently, fundamental knowledge of limiting impairments from the point of view of systems theory is essential. This is the main approach of this thesis:

Based on broad investigation into possible limiting impairments, taking into account system parameters of practical relevance two main impairments are identified. These are cross-phase modulation and ASE-noise. They are investigated in detail using analytical as well as simulative approaches. Thereby, the main focus is set on mitigating the impact of the impairments by implementation of advanced modulation formats.

The thesis is completed by a discussion of important techniques required for numerical simulation of optical transmission systems as well as a description of the simulation environment MOVE-IT, which was developed in the framework of this thesis.