Electronic Predistortion for Compensation of Polarization-Mode Dispersion

Abstract:
One of the major impairments in high-speed optical transmission links is Polarization-Mode Dispersion (PMD). We propose the method of electronic predistortion (EPD) for the mitigation of PMD. This approach has already been successfully applied for the compensation of Chromatic Dispersion (CD) and Fiber-Nonlinearities. The advantage of this method is that impairments can efficiently be mitigated without the need for coherent reception. The proposed scheme is based on the possibility to control the optical field at the transmitter by using two complex modulators for the modulation of two orthogonally polarized optical signals. If the physical origin of PMD is exactly known then the ideal predistorted field and the corresponding electrical driving signals can be computed accurately. In practice, however, this information is not available. Therefore it is shown how to determine appropriate driving signals for a set of measured PMD parameters. Measurements will be communicated through a feedback channel in practice. We suggest a possible strategy for application of this technique in scenarios, in which the adaptation speed is intrinsically
limited due to the round-trip delay. Numerical simulations reveal that the use of EPD can significantly increase the tolerance towards PMD in comparison to a system without compensation.