Abstracts

Statistics of PMD-induced power fading for intensity-modulated double-sideband and single-sideband microwave and millimeter-wave signals

O.H. Adamczyk, A.B. Sahin, Qian Yu, Sanggeon Lee and A.E. Willner. "Statistics of PMD-induced power fading for intensity-modulated double-sideband and single-sideband microwave and millimeter-wave signals." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1962-1967.

Polarization-mode dispersion (PMD) can severely degrade the performance of millimeter-wave fiber-optic links by inducing a power fading penalty of the received signal that is dependent on the subcarrier frequency and accumulated PMD along the fiber. We experimentally investigate the statistics of PMD-induced power fading as a function of the differential group delay (DGD) for intensity-modulated double- and single-sideband subcarrier-multiplexed signals in the absence of chromatic dispersion. We find a similar susceptibility to PMD-induced power fading for both modulation formats with a subcarrier frequency of 7 GHz using a PMD emulator with a Maxwellian distribution of DGD (average DGD /spl sim/40 ps). A significant improvement in the worst case power fading penalty (/spl sim/20 dB) is achieved by using an electronically controlled polarization controller in combination with a single section of polarization maintaining fiber in a dynamic first-order PMD compensator. Furthermore, the results of numerical Monte Carlo simulations support the measured data and show the scalability of PMD-induced power fading for subcarrier-multiplexed signals in the microwave and millimeter-wave region.

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