

COMPARISON AMONG DIFFERENT TYPES
OF ADVANCED MODULATION FORMATS
UNDER FOUR WAVE MIXING EFFECTS

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S u m m a r y

Advanced modulation formats play a significant role for enhancing the bit rate in an optical transmission system. Ultra-long haul transmission distances are intensively investigated to further increase the spectral efficiency for building the next-generation optical networks. However, under a high data rate, the effects of a fiber nonlinearity such as the four-wave mixing (FWM) give a significant lower system performance. In this paper, a system simulation is performed to compare the robustness of four types of modulation formats such as Return-to-Zero Frequency Shift Keying (RZ-FSK), Non-Return-to-Zero Frequency Shift Keying (NRZ-FSK), Differential Phase Shift Keying (DPSK), and Duobinary (DB) to the FWM effect, where the performances were mainly characterized by eye opening penalties and Bit Error Rate (BER). It was found that the FWM power is the lowest with the DPSK modulation format and reaches -55 dBm, while, in the presence of RZ-FSK modulation, it reaches a maximum value and is equal to -14 dBm. In addition, the the DPSK gives a low value of BER of 4.56×10^{-68} in comparison with RZ-FSK modulation that offers BER in the range of 2.83×10^{-14} . It can be concluded that the DPSK modulation can be a crucial component to suppress the FWM effect in a wavelength division multiplexing system.