

# Abstract

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## **Effect of Different Atmospheric Conditions on BER Performance of Wireless Optical Communication with Different Modulation Techniques**

This paper studies and compares the performance of on-off keying (OOK), pulse position modulation (PPM), digital pulse interval modulation (DPIM) and dual-header pulse interval modulation (DH-PIM) schemes in FSO channels in the presence of different weather conditions. The bit error rate (BER) curves for these modulations are simulated. Moreover, a performance comparison between these modulation techniques is provided. Generally, in the absence of turbulence OOK-NRZ (non-return-to-zero) and PPM is found to achieve a better BER performance as compared to DPIM and DHPIM. In the presence of fog, OOK-NRZ and PPM is better than DPIM and DH-PIM by approximately 1 dB at BER  $1e-3$ . While, in case of rain, OOK-NRZ and PPM is better than DPIM and DH-PIM by approximately 1.5 dB at BER  $1e-3$ . Moreover, in case of snow, OOK-NRZ and PPM is better than DPIM and DH-PIM by approximately 1.7 dB at BER  $1e-3$ . Additionally, in the presence of turbulence, in case of weak turbulence, OOK-NRZ and PPM is better than DPIM and DH-PIM by approximately 8 dB and 10 dB, respectively at BER  $1e-3$ . Furthermore, in case of moderate turbulence, OOKNRZ and PPM is better than DPIM and DH-PIM by approximately 6 dB and 8 dB, respectively at BER  $1e-3$ . Finally, in case of strong turbulence, OOK-NRZ and PPM is better than DPIM and DH-PIM by approximately 3 dB and 4 dB, respectively at BER  $1e-3$ .