World Academy of Science, Engineering and Technology
International Journal of Information and Communication Engineering
Vol:12, No:04, 2018

Performance Analysis of a Hybrid DF-AF Hybrid RF/FSO System under Gamma Gamma Atmospheric Turbulence Channel Using MPPM Modulation

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Abstract : The performance of hybrid amplify and forward - decode and forward (AF-DF) hybrid radio frequency/free space optical (RF/FSO) communication system, that adopts M-ary pulse position modulation (MPPM) techniques, is analyzed. Both exact and approximate symbol-error rates (SERs) are derived. The random variations of the received optical irradiance, produced by the atmospheric turbulence, is modeled by the gamma-gamma (GG) statistical distribution. A closed-form expression for the probability density function (PDF) is derived for the whole above system is obtained. Thanks to the use of hybrid AF-DF hybrid RF/FSO configuration and MPPM, the effects of atmospheric turbulence is mitigated; hence the capacity of combating atmospheric turbulence and the transmissitted signal quality are improved.

Keywords : free space optical, gamma gamma channel, radio frequency, decode and forward, error pointing, M-ary pulse position modulation, symbol error rate
Conference Title : ICWITS 2018 : International Conference on Wireless Information Technology and Systems
Conference Location : Lisbon, Portugal
Conference Dates : April 16-17, 2018