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Outage probability of an underwater wireless system based on the CSK transmission

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Abstract

Compared to well-established underwater acoustic communication techniques, underwater wireless optical communication (UWOC) offers significantly more transmission bandwidth and can be used in multiple short-range marine applications. Color-shift keying (CSK) is a modulation techniques advocated for deploying high data rate transmission in red, green and blue (RGB) based laser technology. It utilizes light sources that produce Lambertian light patterns. Consequently, the broadcast message arrives at the receiver via line-of-sight (LoS) pathways, with the Rician distribution being used to model the appropriate channel. This paper analyzes UWOC visible light communication (VLC) links using light emitting diodes (LDs) as transmitter with small angular divergence. The channel direct current (DC) gains is considered in the analysis to show the channel gain, signal-to-noise ratio (SNR), channel capacitance, and outage probability. This study also looks at the outage probability or the locally observed SNR of the CSK link below the threshold set for a particular quality of services. The results are depicted for a random white light in an UWOC system clean ocean. They shows that the SNR of the RGB Based Laser UWOC is proportional to Pt/N0. The results also shows that the channel capacity increases with Pt/N0 depending on the attenuation intensity ß. Finally, as the data rate increases with a fixed Pt/N0, the outage probability increases. The data rate increases with Pt/N0 and the transmission power with a fixed value outage probability.