

ABSTRACT

Along with the development of VLC technology, there are many researches conducted to be carried out on sending information using the Underwater Visible Light Communication (UVLC) communication system. However, unlike indoor VLC system or atmospheric scenarios, UVLC has its own challenges which namely the air exponential attenuation coefficient, and the bandwidth used for the LED light source. This thesis analyzes the effect of turbulence on the performance of a vertical underwater visible light communication.

In this thesis research, two simulation scenarios were used. Scenario I analyze the performance of the vertical link UVLC system using coastal ocean water and clear ocean water with a depth of 20 m each under the absence of turbulence conditions. Then for scenario II, analyzed the performance of the vertical link UVLC system using coastal ocean water and clear ocean water with a depth of 20 m each under the presence of weak, middle, and strong turbulence conditions. The two simulation scenarios were tested based on the value of Received Power (Prx), Signal to Noise Ratio (SNR), and Bit Error Rate (BER).

Based on the results of the study, it can be concluded that turbulence affects the performance of the UVLC system. Where the strength of each turbulence also has its own effect towards the system performance. In scenario I, the best resulting SNR and BER value is at 5 meters depth with clear ocean water which SNR value of 83,73 dB and BER 2.45×10^{-6} . Whereas in scenario II, the best SNR and BER values are produced at 5 meters depth with clear ocean water, which SNR value of 80.65 dB and BER 3.67×10^{-6} under weak turbulence condition, SNR value of 73.83 dB and BER 8.94×10^{-5} under middle turbulence condition, SNR value of 43.80 and BER 2.23×10^{-4} under strong turbulence condition.

Keywords: BER, SNR, turbulence, UVLC, vertical.