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Environmental parameters evaluation of underwater optical wireless communication system

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An underwater optical wireless communication (UOWC) system using 450 nm green light laser source is constructed and studied. The green laser was modulated by a 1.25Gbps NRZ-OOK format with PRBS of 7, 24 or 31, respectively, for system performance comparison. The bit error rate (BER) values were measured in 1.5, 3.0 and 6 m, respectively, for system evaluation. The best BER value is down to 5×10^{-7} for 1.25Gbps data rate in 6 m transmission.

Then, the UOWC transmission system was carried out under several parameters such as temperature, turbulence, artificial seawater by adding salt to simulate practical application in river or sea. When a submerged motor with an output of 1200 L/h is used as water flow turbulence source, the impact to BER and transmission quality is little. For temperature change issue, the experiment shows that at original temperature of 25°C has the best BER as compared to low temperature of 10–20°C or high temperature of 30–50°C. We found that water flow disturbance has little impact to BER and eye diagram quality. Finally, artificial seawater is used to simulate the real seawater environment. Under such situation, the UOWC transmission system can only transmit 3 m instead of 6 m due to impure particles and water disturbance. Both may degrade the BER quality in seawater.

Biography

Prof. Shien-Kuei Peter Liaw received double doctorate degrees from National Chiao-Tung University and National Taiwan University. Prof. Liaw has worked at National Taiwan University of Science and Technology (NTUST) since 2000. Currently, he is Chairman of the Graduate Institute of Electro-Optical Engineering. He was an academic visitor at the University of Oxford in 2011 and at the University of Cambridge in 2018. He authored or co-authored for more than 250 journal articles and international conference papers. He has been actively contributing to many conferences as a keynote speaker and an invited speaker. He serves as a Guest Editor for several journal papers and books.

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