

Master 2014

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Development of an Optical Underwater Communication System.

ABSTRACT - Masterthesis

During the last century different acoustic systems have been developed for underwater networks which could cover ranges of 100 m to more than 1000 km. However, the underwater acoustic signal is influenced by path loss, noise, multi-path, Doppler spread and high variable propagation. Due to these effects this legacy technology provides a bandwidth B in the range of $B = 100$ kHz for distances < 100 m. Tethered communication systems such as optical fibre cables are expensive and go at cost of flexibility. Optical wireless systems that exploit the blue/green window of seawater potentially offer high bandwidth, although short range, communications. The goal of this Master thesis was to gain first experience in optical underwater communication. Therefore an optical transmitter based on a 406 nm blue laser diode was constructed. The transmitter is capable of sourcing 300 mA of current to a laser diode at speeds of up to 150 MHz. A photo-diode receiver with improved responsivity in the blue-green region in contrast to conventional photo-diodes was constructed. Finally, experiments were conducted to validate the design and construction of the transmitter and receiver for different water types and signal frequencies up to 3.2 MHz.