

UNIVERSITI TEKNOLOGI MARA

**INVESTIGATION OF
BUFFER LAYER PARAMETERS FOR
UNDERWATER WIDEBAND ANTENNA**

MARIAM BINTI MAT SAAD

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ABSTRACT

Underwater wireless systems require highly efficient underwater antennas to realize high data rate communication between underwater nodes. This project presents a study on buffer-equipped underwater wideband antennas to realize high speed underwater wireless transmission. Since most underwater environments are lossy mediums affecting the characteristics of conventional antennas, a buffer-layer configuration is considered. In this study, the proposed buffer layer parameters was in terms of the relationship between its dielectric constant and conductivity and RF characteristics of the antenna, by means of 3D-electromagnetic simulation. A microstrip circular patch ultra wideband (UWB) antenna operating at 500 MHz was used as the base antenna, to provide wider bandwidth capability for underwater communication, as most researchers only concentrate on narrow bandwidth. This study proposes buffer layer, with dielectric constant value calculated using geometric average formula. Simulation results indicated that the proposed formula produced the best return loss at 500 MHz.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND STUDY

In 1873, Maxwell first described the theoretical basis for propagation of electromagnetic waves [1]. Human life has been improved by this finding and it has then become one of the important technologies for humankind. Since then, we can see tremendous developments in the area of Wireless Communications. Nowadays, mostly everything in this world is connected by wireless technologies, either on land or deep space. Surprisingly, the ocean that occupied 75% of the earth, has been left out, where electromagnetic waves cannot penetrate so far.

Although acoustic wave is the most effective means for underwater applications, it has many drawbacks such as of long propagation delay, narrow bandwidth, multipath fading and susceptibility to propagation characteristics from back ground media [2].

Meanwhile, the evolution of electronics and information technology has been improved the ocean platforms such as landers, buoys, unmanned surface vehicles, and unmanned underwater vehicles as well as sensors. The study on the applications of underwater electromagnetic wave in range of hundreds meters have been developed before but the commercialized of the short-range low frequency underwater modems has just begun lately.