

**COMPARISON OF SPEED OF SOUND ON DIFFERENT
WATER SAMPLES USING ULTRASONIC SENSOR AS A TOOL
FOR NON-DESTRUCTIVE TESTING**

This thesis is presented in partial fulfillment for the award of the
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ABSTRACT

Nowadays around Malaysia, it can be seen that the resulting speeding-up of contamination and damage to the water environment. For this purpose, Ultrasonic nondestructive testing (UNDT) is applied to study the quality of some water samples. An underwater sound speed measurement system is used for this (UNDT) to evaluate and compare the effect of sound speed due to different water samples. This measurement system consists of a transceiver ultrasonic sensor, a microcontroller, some PVC pipe housing and a computer. A full horn package is implemented to the ultrasonic sensor as it provides peak accuracy and sensitivity. It also produces very narrow beam shape to reduce losses of sound wave signal during the transmission. In this paper, speed of sound have been measured from two different samples of water which are river and sea water. As for each sample, three samples with different levels of pollutions are selected. As the result, all the samples are compared and discussed.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The resulting speeding-up of contamination and damage to the water environment such as river, lake, sea and ground water can be seen around Malaysia [1]. In this sense, water contamination control is found to be more and more indispensable. As the result, the level of harmful contaminants inside the water will increase drastically. This condition will result to sickness or danger to our healthy because from this water it will lead to our drinking water. These harmful contaminants inside the water consists of heavy metals and toxin materials such as magnesium, lead, chromium, mercury, iron and others. Each of these materials has a certain limit of level in the water.

Non Destructive Testing (NDT) is a method of test that had been used to an object without changing the physical properties and causing no structural damage to it [2]. In this project, the object is referred to the water samples and the object used to block the sound wave propagation. Thus, NDT method is implemented toward river and sea water. There are many kind of non-destructive testing methods for example liquid penetration test, eddy current test, magnetic particle test, x-ray and gamma ray radiography test and ultrasonic test. From all these method, ultrasonic non-destructive testing (UNDT) method had been used.

Ultrasonic NDT method requires the use of ultrasonic transducer or sensor. Ultrasonic sensor works at frequency range from 40 kHz up to 400 kHz. The sensor works at high frequency to avoid low frequency noise due to wind, machinery, pump and vibration of