1. Introduction

Moving bottom is one of the phenomena that can be categorized into Shallow Water Equations (SWE). The movements can be triggered by several causes and effects. It is said so because when the bottom of the water surface is moving and shifting it will generate a suitable dangerous phenomenon [1]. Likewise, the phenomenon that we can find in the current situation, an underwater landslide can be produced by instability and less solid obstacle near the coastline and this can be triggered a potential tsunami [2]. However, trigger that can be an effect underwater landslide is mostly an earthquake with small scale [3], [4].

From observations made based on the phenomenon of the underwater landslide, the experiment was implemented that resembled the case. The experiment is executed to get the results of various surface wave effects that arise from moving bottom problems. This experimental activity was made using a glass basin to illustrate a sea, then there was also an object as an obstacle. However, in this paper water bed movements are used to illustrate the moving bottom problem. Where the term of bed is an obstacle in the sea. Observation of the moving bottom is operated by moving the object with the help of magnets in one-directional horizontal. Another parameter is to set water level values in a smooth condition when $t = 0\ s$ and the details can be shown at Fig. 1.

As a result, it produces lateral velocity which affects the wave elevation values at the particular time used. The experiment was implemented using $t = 0.1$ until $t = 2\ s$. The water elevation is set $\eta = 0.1\ m$. The elevation and velocity of the waves at a certain time will be obtained when the obstacle is moved. The idea of this experiment then applied the 1D half nonlinear shallow water model and staggered grid scheme.

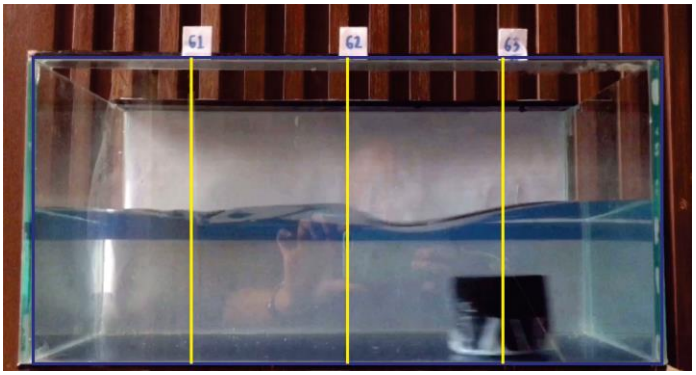

Fig. 1. The capture of the experiment that has been made with $t = 0.8\ s$, and measurement points $G1 = 0.1\ m$, $G2 = 0.2\ m$, and $G3 = 0.3\ m$.

SWE is hyperbolic system of nonlinear equations that is usually associated with various natural phenomena to describe fluid flow that occur on earth [5], [6], [7], [8]. As well, all things which are contained on earth can be said as fluid if a lot of water was given load and movements, thus will generate a water surface. Widely, SWE is a model that can simulated the fluid flows like coastal flooding, water ripple on the basin, river flow, estuaries, etc. [8].

This paper is focused on the simulation of the moving bottom in one-directional horizontal, due to the movement of the bottom in the water at a certain time to generate a wave. Experiment activities conducted, to ascertain more about the impact of the moving bottom in the water, then the experiment was implemented using a glass basin filled with water. Afterward, the moving bottom is illustrated using an obstacle that moves one time in a horizontal direction to get various elevation wave models. Following the experiment was built, the experiment can be seen in Fig.1. To make it obvious to measuring the difference in error

value from simulation data and experimental data, measurements are only taken using three points denoted *G1, G2,* and *G3.* The difference value from the three points will be used to compare simulation and experiment results. The wave velocity is affected by the movement of an object which is denoted by *z*. The details will be shown in the experiment set-up section in Fig. 4.

In this paper, the 1D half nonlinear-SWE model is used to compare numerical simulations with an experimental approach. The SWE is an efficient formula to discribing the phenomenon of fluid dynamics with assumed that it applied is the wavelength of shallow water. To execute this paper, some sections are given as follows. The 1D SWE-moving bottom model and the numerical scheme are presented in Section II. While experiment set-up and numerical result based on experimental approach will be compared in Section III. Finally, to close this paper, the conclusion is given in Section IV.