Research Article

THE ANGLE CONVERSION OF DEGREE INTO RADIANT AND VISUALIZATION OF WAVE USING *PHP: HYPERTEXT PREPROCESSOR* PROGRAMMING LANGUAGE

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ABSTRACT

Physics is an important learning which requires learners to understand the material well. Waves are physical materials that can be represented graphically. This study examines the conversion of angles from degrees to radians and graphical visualization of sinusoidal waves using PHP (PHP: Hypertext Preprocessor) programming language and XAMPP with web browser. The results of this study is the interface display of angle conversion from degrees to radians and graphics of wave phenomenon.

INTRODUCTION

Learning is a process of changing of concept understanding of a science. The process of changing of concept understanding is a unity of transfer process, understanding level, predictability, problem solving, and process of knowledge translating (Holme, Luxford, & Brandriet, 2015). Learning can said tha succeed if students are able to understand the concept of material well (Georgiou & Sharma, 2015).

Physics is an important learning for many professions and fields without seeing gender in order to be able to solve modern society problem (Baran, 2016; Gibson *et al*., n.d.). Physical learning requires students to be able understand the concept of matter and practice, this is the result of research (Dyrberg *et al*., 2016) which states that students significantly comfortable in operating laboratory equipments. Experiment skill of students is a scientific process skill which contributing factor in enhancing conceptual understanding (Gultepe, 2016). The level of conceptual understanding, especially physical learning, is manifested by means interpreting learning problem. Problem interpretation in physical learning can be done using simulations, graphics, and worksheet tutorials (Barniol & Zavala, 2016; Ferreira, Seyffert, & Lemmer, 2017; Smith,

Thompson, & Mountcastle, 2013; Uddin, Ahsanuddin, & Khan, 2017).

Graphics is a form of representation that can be used to explain the concept of matter and phenomenon in physical learning (Docktor & Mestre, 2014) interpretation using graphics is influenced by several factors such as aspect of characteristics, content and graphics knowledge (Glazer, 2011). This is as the result of research (Nixon, Godfrey, Mayhew, & Wiegert, 2016) which shows that data interpretation using graphics can be used for reduce the experiment errors, determine the value of a variable, and explain the relationships between variables. The result of research (Susac, Bubic, Martinjak, Planinic, & Palmovic, 2017) stated that graphical representation has advantages in interpreting the measurement data and comparison data. Problems in physical learning that are easy to interpret using graph among others is the concept of wave.

Wave is a concept in physics that explains the propagation of vibration (oscillation). Waves can propagate with medium and without medium. Waves which require a medium in its propagation is called a mechanical wave. Waves which does not require a medium in its propagation is called electromagnetic waves (Mikrajuddin, 2017). Based on the direction of the propagation, wave is divided into transversal

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waves and longitudinal waves (Tipler, 2004). Waves have a variety of indication such as reflection, refraction, superposition, diffraction, interference, polarization and dispersion. Indication of superposition is a combination of two or more waves that propagate together so it generates waves with certain amplitudes (Mikrajuddin, 2017).

Indications of wave superposition can be interpreted using graphs by software to visualize it so it can be analyzed (Kinchin, 2016). Software that can be used to visualize waves including the programming language PHP: Hypertext Preprocessor (PHP). PHP is kind of Server Side Scripting in the form of a web programming in which the program is compiled in server so it possible to generate more dynamic web pages (Solichin & Kom, n.d). Some uses of PHP include object-oriented programming, manipulating images, handling email and manipulating file (Lurig & Lurig, n.d.). PHP uses browser to display the executable (*run*) of the program, *XAMPP* as control panel server and *notepad ++* as text editor. Here is the interface display of *XAMPP* and *notepad ++*.
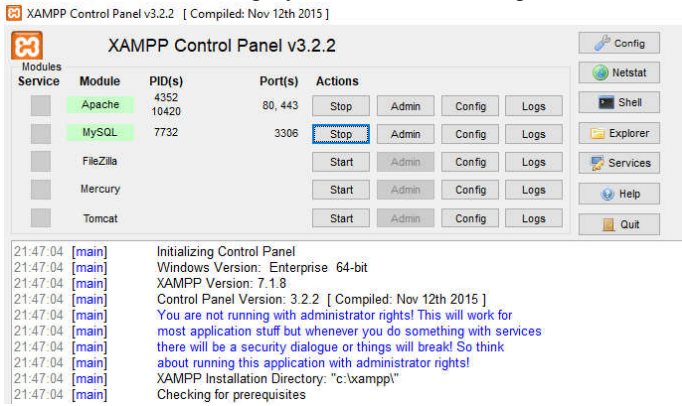

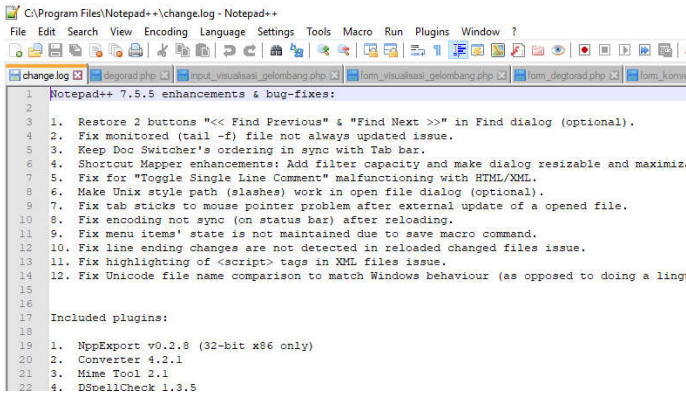**Figure 1** The Display of XAMPP Control Panel v3.2.2.

Figure 2 The Display Notepad View ++

In this article, will discussed the uses of PHP (*PHP: Hypertext Preprocessor*) for visualize the graph of the wave superposition event.

METHOD

In this study, will be discussed the conversion of angles from degrees to radians and graphical visualizations of waves and the superposition. For example, the wave represented is a sinusoidal wave. PHP can provide the results of angle conversion and wave visualization using the script typed in the text editor notepad ++. The results of the script can be executed (run) using browser and XAMPP as control panel.

RESULTS AND DISCUSSION

The first study is to create an interface page using *html* and *php* scripts as a means to input angle values and wave amplitudes using *notepad ++*. *Notepad ++* acts as a text editor for typing and editing scripts before being executed (*run*) with the help of *XAMPP* as a control panel. Figures 3 and 4 below are scripts from a interface page view for angle and waveform conversion.
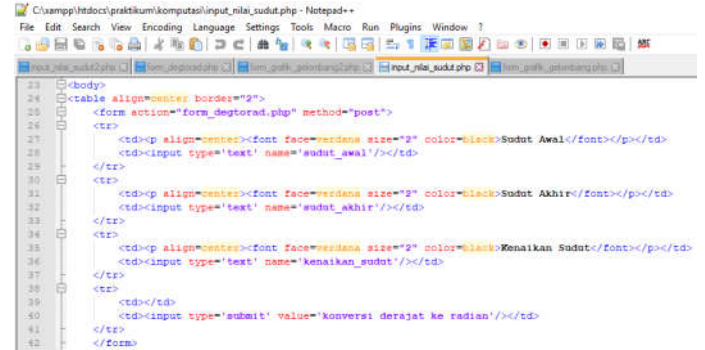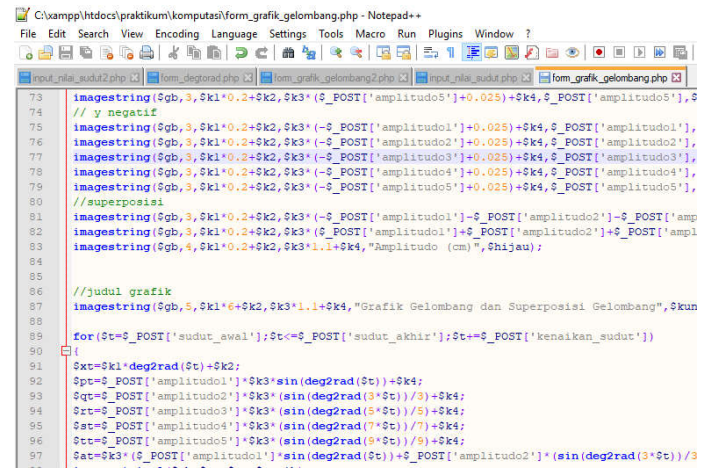

Figure 3 Script input for angle value

Figure 4 Screen waveform graphic script

The angle value input script is created using the notepad ++ text editor saved with the*.php extension. This script will be run using a web browser with the help of xampp as a control panel as shown in Figure 5. Figure 5 display can be made more dynamic by changing the display using notepad ++(Solichin & Kom, n.d.)
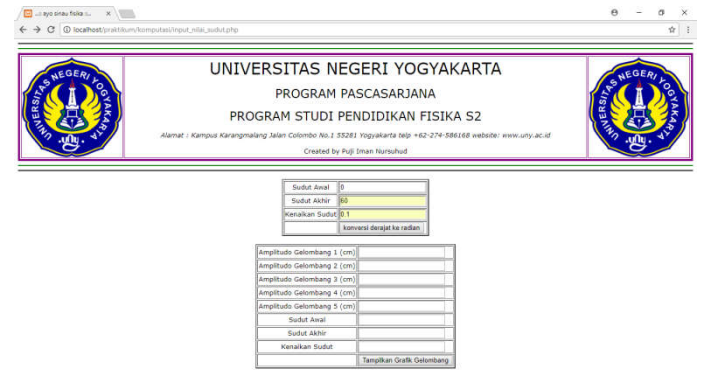

Figure 5 Display the run result (execution) of the input script for angle and graphic values

Figure 6 Output angle conversion that runs using a web browser

The angle conversion output displays the resulting conversion angle value from degrees to radians. The angle value entered in the input display Figure 5 is an angle in degrees with run (execution) results as shown in Figure 6 Angle column. The input of angle value is then converted into radians. The result of converting angle to radian angle as Fig. 6 column of Radian Angle. Figure 6 also shows the sine value of $\sin x$, $\frac{1}{3}\sin 3x$, $\frac{1}{5}\sin 5x$, $\frac{1}{7}\sin 7x$, dan $\frac{1}{9}\sin 9x$. Figures 5 and 6 show that PHP can be used to manipulate objects, images and files(Lurig & Lurig, n.d.)
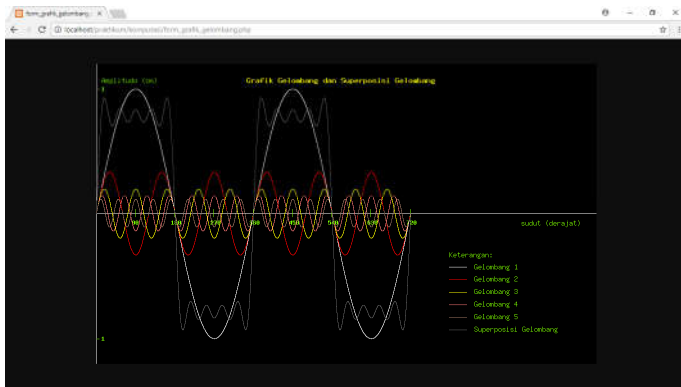

Figure 7 Graphical display of $\sin x$, $\frac{1}{3}\sin 3x$, $\frac{1}{5}\sin 5x$, $\frac{1}{7}\sin 7x$, dan $\frac{1}{9}\sin 9x$ with the same wave amplitudes.

Figure 7 shows the run (execution) of the script form_grafik_gelombang.php. Figure 7 above shows a wave chart of $\sin x$, $\frac{1}{3}\sin 3x$, $\frac{1}{5}\sin 5x$, $\frac{1}{7}\sin 7x$, dan $\frac{1}{9}\sin 9x$ with the same amplitude. The amplitude value of the $\sin x$ wave is three times the amplitude of the $\frac{1}{3}\sin 3x$ wave. The wave superposition phenomenon is generated from the sum of each wave $\sin x + \frac{1}{3}\sin 3x + \frac{1}{5}\sin 5x + \frac{1}{7}\sin 7x + \frac{1}{9}\sin 9x$. Figure 7 shows that wave superposition phenomena can be visualized graphically using PHP programming language(Docktor & Mestre, 2014; Lurig & Lurig, n.d.).

CONCLUSION

Angle conversion and graphical visualization are important in physics learning. The results of the analysis and discussion state that the PHP programming language *(PHP: Hypertext Preprocessor)* can be used as a tool for angle conversion and graphical waveform phenomenon with the help of XAMPP as control panel and web browser.

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