International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 6(B); June 2018; Page No. 13210-13212
DOI: http://dx.doi.org/10.24327/ijcar.2018.13212.2344

Research Article

MAGNETIC SUSCEPTIBILITY ANALYSIS USING WORKSHEET

Rio Sandhika Darma*., Puji Iman Nursuhud and Heru Kuswanto

Graduate Program, Department of Physics Education, Yogyakarta State University

A R T I C L E I N F O

Article History:

Received 9th March, 2018
Received in revised form 16th April, 2018 Accepted 3rd May, 2018
Published online 28th June, 2018

Key words:

Spreadsheet, magnetic susceptibility

A B S T R A C T

The Worksheet is very easy to use. In the basic for use of the Worksheet, there is an important aspect of the Worksheet is Spreadsheets which can be used to analyze data. Spreadsheets can also be used as graphic simulation tools. The graph simulation to be analyzed is graph of magnetic susceptibility to temperature.

INTRODUCTION

The use of Spreadsheets in presenting simulations is indeed very popular among teachers and students. Worksheet one of the programs made by Microsoft companies already support for the use of Spreadsheet. So everyone who is not a programmer can use it. From various experts have also utilized this speasdheet for research, business, and education (Uddin dkk, 2017). This graphical animation method has the potential to revolutionize the use of spreadsheets for dynamic process simulations (Wischniewsky, 2008). Graphics are one of the best ways to visualize and investigate the behavior of functions and equations. Graphics depicts more information about function (El-Gebeily and Yushau, 2007).

Magnetic susceptibility is the ability of a magnetic material to be magnetized determined by the magnetic susceptibility value represented by the equation:

$$\vec{M} = k\vec{H} \qquad \ldots 1$$

$\vec{M}$ With is magnetic intensityin A/m, k isthe value of the susceptibility of a material and has no $\vec{H}$ dimension and is strong magnetic fieldin A/m. Value of k isthe basic parameters used in the magnetic method. The value of the susceptibility of rocks is greater if in these rocks are found many minerals that are magnetic. Litology (characteristics) and mineral content of rocks are the factors that affect the susceptibility of a material (Telford, 1990).

Corresponding author:* **Rio Sandhika Darma
Graduate Program, Department of Physics Education,
Yogyakarta State University

From the results of thermodynamic calculations that minimize free energy as a function of temperature, and it is shown that the decrease in susceptibility to temperature and at mid temperature can be proven by equation:

$$\chi = \frac{\mu_0 N p_m^2}{3k_B T} \qquad \ldots 2$$

With N many particles per volume, $k_B$is Boltzmann constant, T temperature stable, μ_0 is vacuum permeability, and $p^2_m$is dipol moment (Mitchell, 2004).

RESULT AND DISCUSSION

From equation (2) we can determine the value of each variable, so in accordance with the magnetic susceptibility value that we will analyze using the Worksheet application

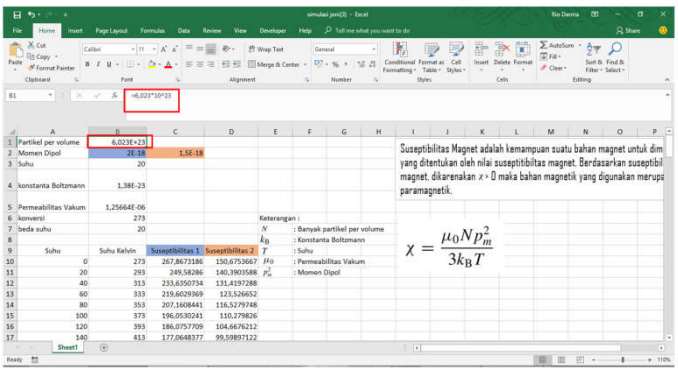

Fig 1 Specifies the particle value constant per volume (*N)*

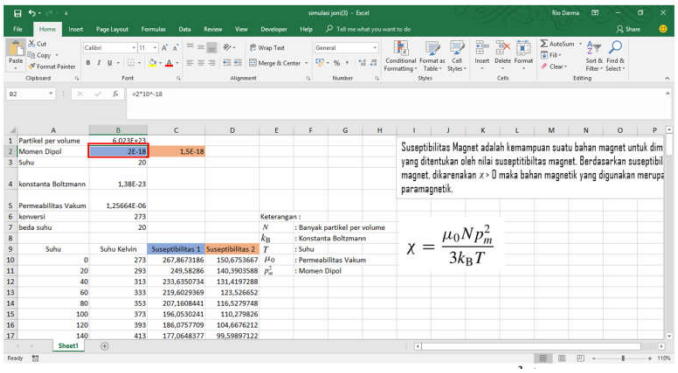

Fig 2 Determining the material 1 dipole moment value (p^2_m)

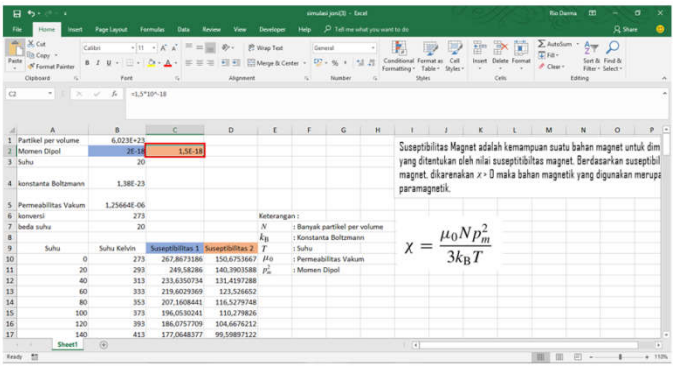

Fig 3 Determining the material 2 dipole moment value

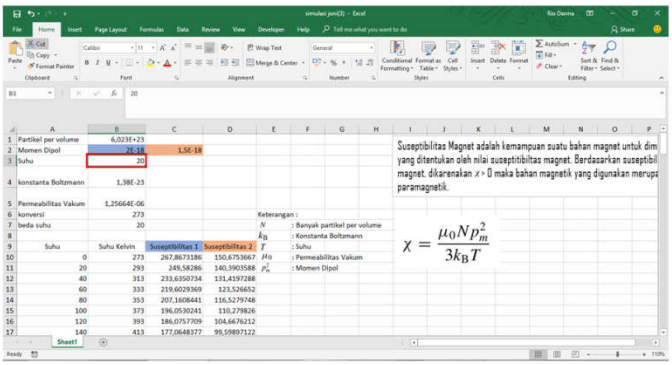

Fig 4 Determine the value of stable temperature (T)

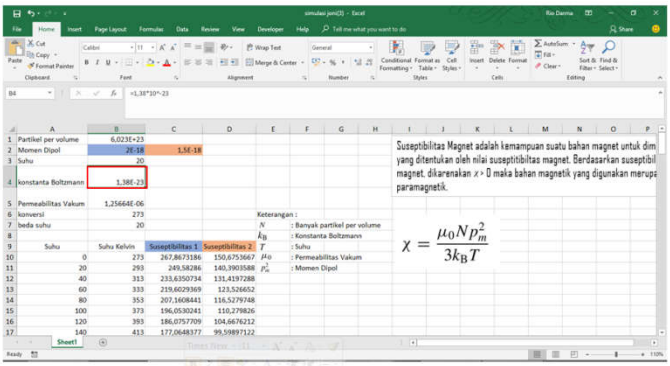

Fig 5 Includes Boltzmann's constant value (k_B)

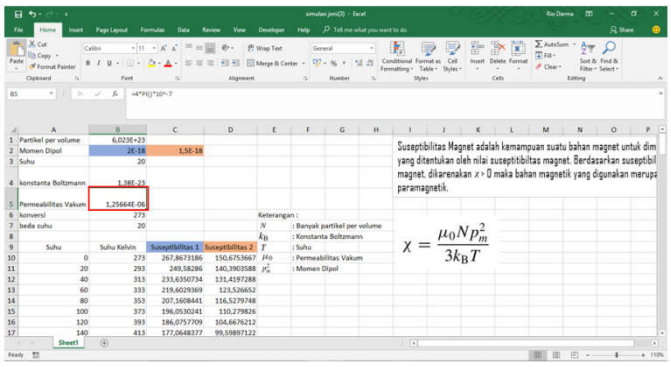

Fig 6 Determine vacuum permeability (μ_0)

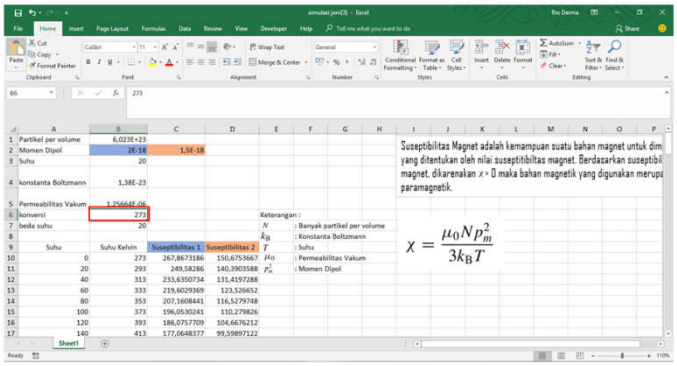

Fig 7 Specifies the temperature conversion to Kelvin

To see the tendency of the graph of the magnetic susceptibility value with temperature (Figure 11), it is determined starting from 0° Celcius temperature to 2920° Celcius with a difference in temperature rise of 20°. Then converted to Kelvin temperature.

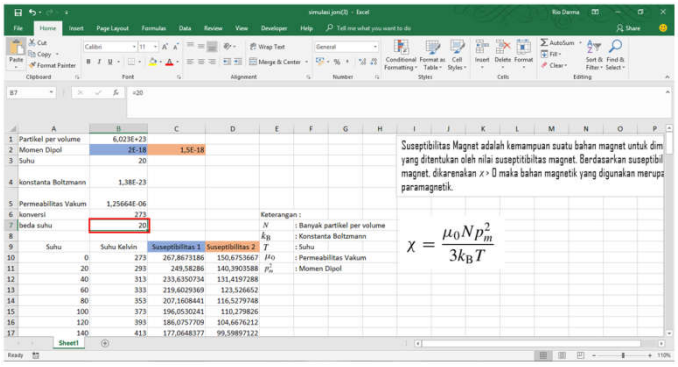

Fig 8 Determine the temperature difference

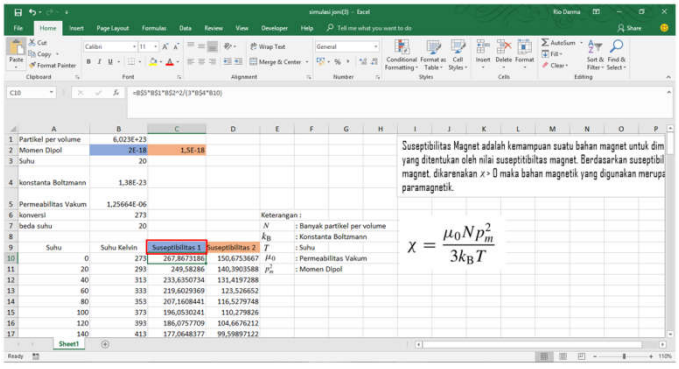

Fig 9 In accordance with the equation specified for material 1

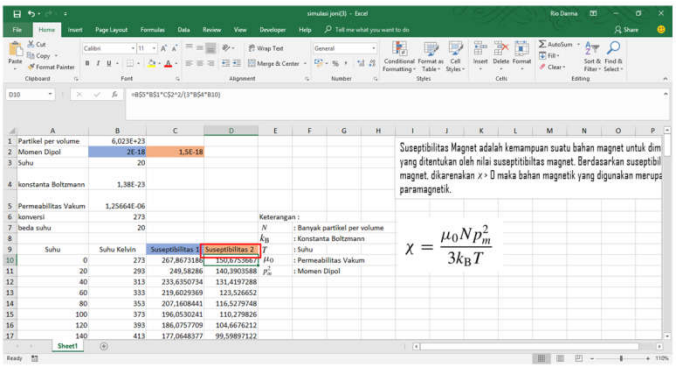

Fig 10 In accordance with the equation specified for material 2

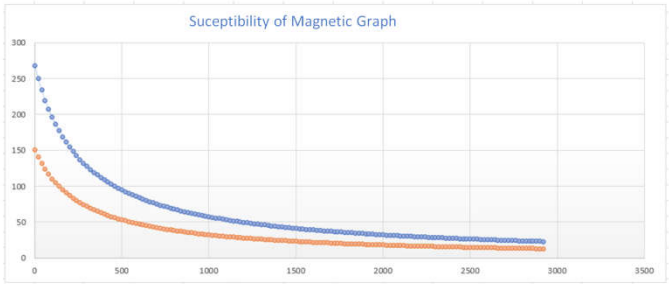

Fig 11 OutputGraph of magnetic susceptibility value to temperature with two different magnetic materials.

CONCLUSION

Spreadsheets in Worksheet are helpful in understanding physics through graphs and simulations. Commands on the spreadsheets required for all of these activities are easy to implement. Especially in analyzing graph of magnetic susceptibility to temperature change. According to the data and graphs that have been discussed, the higher the temperature given the magnetic susceptibility value will decrease. Through the data and graph of the magnetic susceptibility value to temperature also, it can be known that the material used in the magnet can affect also, but the graph described is the same.

References

1. El-Gebeily, M and Yushau, B (2007) "Curve Graphing in MS Excel and Applications," Spreadsheets in Education (eJSiE): Vol. 2: Iss. 2, Article 6. Available at: http://epublications.bond.edu.au/ejsie/vol2/iss2/6
2. Mitchell, S. Brian.2004. An Introduction Materials Engineering and Science. Canada: John Wiley & Sons, Inc
3. Telford, W.M., Goldrat, L.P., dan Sheriff, R.P., 1990, Applied Geophysics 2nd ed, Cambridge University Pres, Cambridge
4. Uddin, Z. Ahsanuddin, M. Khan, A Danish. 2017. Teaching Physics Using Microsoft Excel. IOPScience. http://doi.org/10.1088/1361-6552/aa7919
5. Wischniewsky, Wilfried A.L. (2008) "Movie-like Animation with Excel's Single Step Iteration Exemplified by Lissajous Figures," Spreadsheets in Education (eJSiE): Vol. 3: Iss. 1, Article 4. Available at :http://epublications.bond.edu.au/ejsie/vol3/iss1/4

How to cite this article:

Rio Sandhika Darma *et al* (2018) 'Magnetic Susceptibility Analysis Using Worksheet', *International Journal of Current Advanced Research,* 07(6), pp. 13210-13212. DOI: http://dx.doi.org/10.24327/ijcar.2018.13212.2344

****