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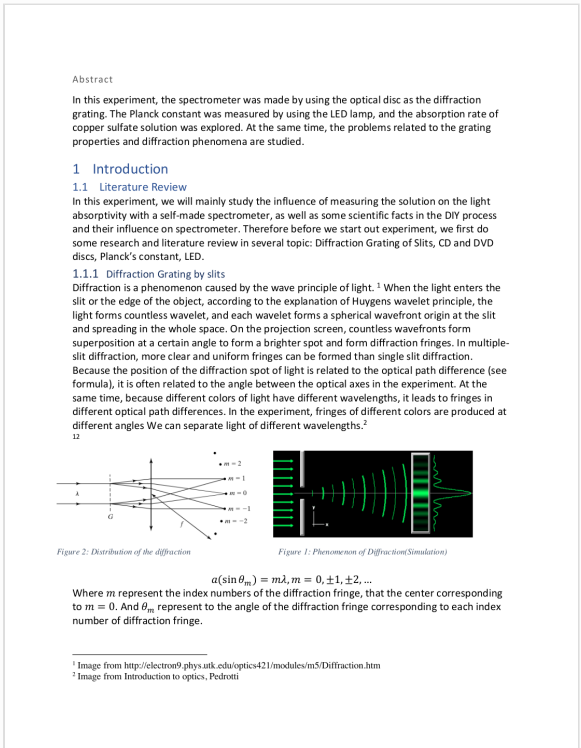

Abstract

In this experiment, the spectrometer was made by using the optical disc as the diffraction grating. The Planck constant was measured by using the LED lamp, and the absorption rate of copper sulfate solution was explored. At the same time, the problems related to the grating properties and diffraction phenomena are studied.

1 Introduction

1.1 Literature Review

In this experiment, we will mainly study the influence of measuring the solution on the light absorptivity with a self-made spectrometer, as well as some scientific facts in the DIY process and their influence on spectrometer. Therefore before we start out experiment, we first do some research and literature review in several topic: Diffraction Grating of Slits, CD and DVD discs, Planck's constant, LED.

1.1.1 Diffraction Grating by slits

Diffraction is a phenomenon caused by the wave principle of light. [1] When the light enters the slit or the edge of the object, according to the explanation of Huygens wavelet principle, the light forms countless wavelet, and each wavelet forms a spherical wavefront origin at the slit and spreading in the whole space. On the projection screen, countless wavefronts form superposition at a certain angle to form a brighter spot and form diffraction fringes. In multiple-slit diffraction, more clear and uniform fringes can be formed than single slit diffraction. Because the position of the diffraction spot of light is related to the optical path difference (see formula), it is often related to the angle between the optical axes in the experiment. At the same time, because different colors of light have different wavelengths, it leads to fringes in different optical path differences. In the experiment, fringes of different colors are produced at different angles We can separate light of different wavelengths.[2]

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Figure 2: Distribution of the diffraction

Figure 1: Phenomenon of Diffraction(Simulation)

$$a(\sin\theta_m) = m\lambda, m = 0, \pm1, \pm2, \ldots$$

Where m represent the index numbers of the diffraction fringe, that the center corresponding to $m = 0$. And θ_m represent to the angle of the diffraction fringe corresponding to each index number of diffraction fringe.

[1] Image from http://electron9.phys.utk.edu/optics421/modules/m5/Diffraction.htm
[2] Image from Introduction to optics, Pedrotti

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