

# Light Spectrum Analysis Of Solar Voltage-Current Characteristics

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## ABSTRACT

This study aims to observe the spectrum of visible light at voltage currents that have different characteristics. The light spectrum is formed due to the decomposition of light which is called light dispersion. Sunlight has various types of electromagnetic wave spectrum, one of which is visible light. Light is a natural phenomenon that is studied in physics learning. The basic laws of light are studied in geometric optics. The variables of this study used the independent variable, namely the physics module, based on the integration of science related to the material of electromagnetic waves. Electromagnetic waves have an electric current charge without the need for an intermediate medium.

**Keywords:** Light spectrum, electromagnetic wave, Analysis

## INTRODUCTION

The sun (sunshine) is one of the renewable energy that can generate electrical energy. Indonesia is a tropical country, so there is plenty of sunlight[1]. Sources of electromagnetic waves are naturally generated by the sun and the Earth in a wave spectrum, such as microwaves, radio waves, infrared, visible light, ultraviolet rays, X rays and gamma rays. While the source of artificial electromagnetic waves comes from the wiring system and household electrical equipment when electrified[2].

Light is an electromagnetic wave. Based on Maxwell's calculations, the speed of electromagnetic waves in a vacuum is  $3 \times 10^8$  m/s, the same as the measured speed of light. This proves that light is an electromagnetic wave. Maxwell's statement was confirmed by Heinrich Hertz in 1857-1894[3]. A light that emits then illuminates the room around us is caused by the wavelength of the emitted light received by our eyes. But when the wavelength is not as long as the human eye can reach, then the human eye will not see it[4].

When looking at sunlight with the naked eye, the visible colours are yellow and orange [5]. And the sun radiates its rays in all colours, but because yellow is the lightest wavelength,

the colour that can be seen with the naked eye is yellow.

Electromagnetic waves have a charge of electric and magnetic energy without the need for a propagation medium. In other words, it can be said that electromagnetic waves can propagate even in a vacuum. In general, electromagnetic waves are shaped like transverse waves. Electromagnetic waves have a direction of propagation that is perpendicular to the direction of vibration. Humans use electromagnetic waves a lot in their daily life.

Because electromagnetic waves are transverse waves, electromagnetic waves can undergo polarization, reflection (reflection), refraction (refraction), interference, and bending (diffraction).

The electromagnetic wave spectrum consists of various types of electromagnetic waves distinguished by their frequency or wavelength. Electromagnetic waves have seven spectrums of electromagnetic waves, namely: radio waves, microwaves, infrared rays, visible light, ultraviolet rays, X rays, and gamma rays.[6].

## RESEARCH METHODS

This article was written using the literature method. The Literature Method describes

research obtained from various sources (journals, books, websites, and others). This research has an acceleration that is in line with several sources of literature and research conducted. The author also collects data, reads and takes notes, and processes data from several journals to complete this article [7].

To solve this research problem. The study conducted a literature review using the procedure by Cooper (1988) for literature synthesis. This systematic procedure can help authors to:

- a) formulate problems,
- b) collecting data,
- c) evaluate the feasibility of the data,
- d) analyze and interpret relevant data, and
- e) organize and present the results of the literature review[8]

## RESULTS AND DISCUSSION

Electromagnetic waves charge electric and magnetic energy without the need for a propagation medium [9]. In other words, it can be said that electromagnetic waves can propagate even in a vacuum. Electromagnetic waves have several properties, including changes in electric and magnetic fields that co-occur. Electromagnetic waves can propagate in a vacuum, the magnitude of the electric field is directly proportional to the magnetic field, the direction of the magnetic field and the electric field are perpendicular to each other, and the rule of both is perpendicular to the direction of propagation of the wave, electromagnetic waves are transverse waves.

The spectrum of electromagnetic waves is an arrangement of all forms of electromagnetic waves based on wavelengths and frequencies in sequence—the spectrum of electromagnetic waves without having different colours. The frequency of the waves causes the colours in the electromagnetic spectrum. Based on the frequency of these waves, the nature or facts of electromagnetic waves can be known[10].

The spectrum of electromagnetic waves with

many types. One example of the spectrum of electromagnetic waves by the sun is ultraviolet light. The sun is the primary source that emits ultraviolet light on the Earth's surface. Besides being produced from the sun, ultraviolet light can also be produced by moving electrons in atomic orbitals, carbon arcs, and mercury lamps. Ultraviolet light is used for UV lamps and plastic eye surgery.

Ultraviolet light is an electromagnetic wave whose frequency is between 10<sup>15</sup> Hz to 10<sup>16</sup> Hz. The wavelength is between 10 nm to 100 nm. Ultraviolet rays from the sun in certain levels can stimulate the body to produce vitamin D. In particular, and ultraviolet light can also be applied to kill germs.

One form of a natural order that we can feel and observe is the regularity of the sun's daily motion, which always rises on the eastern horizon and sets in the west. The sun's position provides exposure to sunlight with a diverse spectrum of colours. At dusk, not long from sunset, we can sometimes see a clear sky view [11], called the twilight violet. In the KBBI, the term violet is a word that defines the combination of two colours, namely yellow and purple or called the colour orange, and this definition describes the condition of the colour combination that appears in the sky due to the twilight scattering of solar radiation.

The Twilight phenomenon is the scattering of white light radiated by the sun with particles of the Earth's atmosphere. White light is polychromatic light formed from various monochromatic colour spectrums. States that solar electromagnetic wave radiation scattering by the Earth's atmosphere to atmospheric diameter particles and wavelengths[12].

## CONCLUSION

Electromagnetic waves have a charge of electric and magnetic energy without the need for a propagation medium. The spectrum of electromagnetic waves is an arrangement of all forms of electromagnetic waves based on wavelengths and frequencies in sequence. The electromagnetic wave spectrum has many

types, including radio waves, microwaves, infrared rays, visible light, ultraviolet rays, X rays, and gamma rays. One characteristic phenomenon of electromagnetic waves from the sun that we can see in everyday life is twilight.

#### ACKNOWLEDGEMENT

The research team would like to thank University of Jember

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