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A Theoretical Assay on the Quantization of the Waves of Electromagnetic Waves Based on Logarithmic Analysis

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"Je pense donc je suis" R. Descartes 1637

Abstract

Electromagnetic waves (EMWs) are defined by two laws, the Planck law $E = h\nu$ and an authorless law $\lambda\nu = c$. Planck law was the basis and the start of the quantum era, that EMW energy is quantized in a way it can be delivered by a small amount called h. This leaves the wavelength in an ambiguous status. It is my opinion that the second law can be expressed in a logarithmic way. This mathematical interpretation, never been used before, is the basis of EMW λ quantization. Every frequency ν of an EMW is associated with a specific λ. This way EMW are quantized in their energy and wavelength. Other waves in nature like water, sound and seismic are not quantized at all.

An authorless law

In a footnote, on page 27, of his book "On gravity, a brief tour of a weighty subject", A. Zee said: *"Newton's law of gravity is profound, but the law given here $c = \lambda\nu$ is trivial"* [1]. There is no name attached to this law, it is a kind of self-evident law. Maxwell mentioned this law. In the quantum era, the meaning of this law has not been updated, with dramatic consequences.

Linear vs logarithmic analysis

Electromagnetic Waves (EMWs) are characterized by their wavelength λ and frequency ν linked together by this trivial law. The variations of both parameters are limited by the speed of light c. Although it looks like a linear law, the frequency can have only integral values: 1, 2, 3 etc. The plot λ (y-axis) versus the ν (x-axis) shows serial dots having the shape of a logarithmic law. In fact, it is like the radioactivity decay law. In this case, we have the evolution of the number of radioactive atoms over time represented by the number (integrals only) of half-lives which are specific for each radioactive atom. The whole process starts with the number

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of radioactive atoms at time zero, that number is the constant, and all the following radioactive atom numbers are a serial subdivision by 2^n of that constant, at time zero. n is the integral number of half-lives. As an example, at time zero we have 1024 radioactive atoms, after 1 half-life we have 512 (2^1), after 2 half-lives we have 256 (2^2), and after 4 half-lives we have 64 (2^4). With the $\lambda v = c$ law, we have the same thing but with a twist, namely $\lambda = c / v$. It starts with $v = 1\ Hz$ and λ is equal to c, 300000 km. For $v = 2\ Hz$, λ equals 150000 km. For $v = 3\ Hz$, λ equals 100000 km. When v is in the range of X-rays and gamma rays, λ is in the range of particle size. As the frequency progresses, the wavelength becomes smaller. So, the constant number 300000 is serially divided by the integral number of Hz 1, 2, 3, 4, 5 etc. Looking at the plot $\lambda = c / v$, the x-axis representing the frequencies 1, 2, 3 etc., is tempting to replace 1 by $1 = \log_b b^v$, so the same procedure can be applied to all frequencies 1 Hz, 2 Hz, 3 Hz etc. For every value of frequency, the base b can be different. Up to now, EMW were characterized by their frequency and wavelength, from now on EMW are characterized by their frequency, wavelength and base. Therefore, we can have different EMWs with the same frequency, the same wavelength and different bases. I have absolutely no idea what EMW base means. For now, it is a mathematical fiction, like other fiction such as the earth is round, $E = mc^2$, black holes, parallel universe, we will see. So, the trivial law $\lambda v = c$ becomes $\lambda \log_b b^v = c$, both formulations of the law give the same results λ and v and open the door for new possibilities. This new logarithmic law can be called progressive logarithm because it involves progressive bases.

Consequences

1. Any mathematical law having two variables evolution is limited by a constant, like $\lambda v = c$, and if one of the variables can have only integral numbers, that law *is* logarithmic and not linear. The law $\lambda v = v$ which describes water waves is not logarithmic because the speed v is not constant. The speed of raindrops-induced water waves is smaller than the speed of heavy meteorites falling on the ocean.
2. The law $\lambda v = c$ and its logarithmic formulation show clearly that EMW has a specific wavelength associated with every frequency number and all these wavelengths are derived from the 1 Hz frequency associated wavelength equal to the value of **c**, which is 300000 km. Therefore, EMW wavelengths are quantized. And **c** the constant speed of light in a vacuum, crowned by Einstein's special relativity as the speed limit in the universe, is also the wavelength of the smallest amount of electromagnetic energy h . According to Planck law $E = hv$, for 1 Hz frequency $E = h$. And according to the law $\lambda v = c$ **,** for 1 Hz frequency $\lambda = c$. So, the value of **c** has two meanings: the speed of EMWs in the vacuum, and the value of λ of the smallest amount of electromagnetism energy h in the universe, referred to as the Planck constant.
3. As the energy of EMWs is quantized by Planck law $E = hv$, the EMWs λ are quantized by the law $\lambda v = c$. Hence the double quantization of EMWs.
4. Logarithmic numbers can describe quantum events.
5. The quantization of EMW energy done by Max Planck and the quantization of the wave of EMW by this paper will make possible a new interpretation of the light refraction as explained in another paper submitted to the Journal of Physics and Astronomy (2).

References

1. Zee A. On Gravity, a brief tour of a weighty subject. ISBN 978-0-691-17438-9.2018: p27
2. Alileche A. A theoretical assay on the similarity of light refraction and the Compton effect. J Phys. Astron. Submitted; 2022