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Research Article

Variable sunlight velocity

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Abstract

In this paper variable sunlight velocity was examined. The sunlight is electromagnetic waves. The velocity of light Einstein states that to constant, however, light velocity is changeable. This is influenced to the 5G and 6G generation wireless networks. The 6G technology will improves areas of imaging presence technology. Working in conjunction with artificial intelligence, the computational infrastructure will be able to autonomously determine the best location. The radiance at the center of the Sun's disk is somewhat higher than the average over the whole disk due to limb darkening. The equation of electromagnetic field was extended in this paper.

Keywords: *Sunlight, velocity, waves, random, radiation.*

Introduction

Sunlight is a portion of the electromagnetic radiation given off by the Sun, in particular infrared, visible, and ultraviolet light.

In physics, electromagnetic radiation refers to the waves of the electromagnetic field, propagating through space, carrying electromagnetic radiant energy. It includes radio waves, microwaves, infrared, light, ultraviolet, X-rays, and gamma rays.

The electromagnetic (EM) spectrum is the range of all types of EM radiation. Radiation is energy that travels and spreads out as it goes – the visible light that comes from a lamp in your house and the radio waves that come from a radio station. In physics, electromagnetic radiation *(*EM radiation or EMR) refers to the waves (or their quanta, photons) of the electromagnetic field, propagating (radiating) are two types of electromagnetic radiation.

6G-sixth-generation wireless is the successor to 5G cellular technology. 6G networks will be able to use higher frequencies than 5G networks and provide substantially higher capacity and much lower latency. One of the goals of the 6G Internet will be to support one micro-second latency communications, representing 1,000 times faster or 1/1000th the latency than one millisecond throughput [1]-[4].

The 6G technology market is expected to facilitate large improvements in the areas of imaging, presence technology and location awareness. Working in conjunction with artificial intelligence, the computational infrastructure of 6G will be able to autonomously determine the best location for computing to occur; this includes decisions about data storage, processing and sharing. 5G is the 5th generation mobile network. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks. 5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices. Some 5G pundits contend that the new network generates radiofrequency radiation that can damage DNA and lead to cancer; cause oxidative damage that can cause premature aging; disrupt cell metabolism; and potentially lead to other diseases through the generation of stress proteins.

At low frequencies, external electric and magnetic fields induce small circulating currents within the body. The main effect of radiofrequency electromagnetic fields is heating of body tissues. There is no doubt that short-term exposure to very high levels of electromagnetic fields can be harmful to health [5],[6].

To protect against 6G and 5G and other electromagnetic fields in your home, the electromagnetic field home adaptor is recommended. The home adaptor will correct the 6G or 5G or 4G signal going to devices like a tablet in our home. It will not fully protect against fields originating out of your home (such as the neighboring routers and cell towers).

Some studies have found a link between electromagnetic field exposure and a higher risk of childhood leukemia, but other studies have not. Other studies have not found proof that electromagnetic field exposure causes other childhood cancers. Studies in adults did not prove that electromagnetic field exposure causes cancer.

In this work variable sunlight velocity and electromagnetic waves were examined.

1. Sunlight

When direct solar radiation is not blocked by clouds, it is experienced as sunshine, a combination of bright light and radiant heat (atmospheric). When blocked by clouds or reflected off other objects, sunlight is diffused. Sources estimate a global average of between 164 watts to 340 watts per square meter over a 24-hour day, to be about a quarter of Earth's average total solar irradiance.

The ultraviolet radiation in sunlight has both positive and negative health effects, as it is both a requisite for vitamin D_3 synthesis and a mutagen.

Sunlight is a key factor in photosynthesis, the process used by plants and other autotrophic organisms to convert light energy, normally from the Sun, into chemical energy that can be used to synthesize carbohydrates and fuel the organisms' activities.

Daylighting is the natural lighting of interior spaces by admitting sunlight. Solar irradiance is the solar energy available from sunlight.

Researchers can measure the intensity of sunlight using a sunshine recorder, pyranometer, or pyrheliometer. To calculate the amount of sunlight reaching the ground, both the eccentricity of Earth's elliptic orbit and the attenuation by Earth's atmosphere have to be taken into account. The extraterrestrial solar illuminance (E_{ext}), corrected for the elliptic orbit by using the day number of the year (dn) and illuminance constant (E_{sc}) is given to a good approximation by

$$E_{ext} = E_{sc}(1 + 0.033412 \times \cos(2\pi dn - 3.365)) \quad (1)$$

where dn =1 on January 1; dn =32 on February 1; dn =59 on March 1 (except on leap years, where dn =60), etc. In this formula dn =3 is used, because in modern times Earth's perihelion, the closest approach to the Sun and, therefore, the maximum E_{ext} occurs around January 3 each year. The value of 0.033412 is determined knowing that the ratio between the perihelion (0.98328989AU) squared and the aphelion (1.01671033AU) squared should be approximately 0.935338.

The solar illuminance constant (E_{sc}), is equal to 128×10^3 lux. The direct normal illuminance (E_{dn}), corrected for the attenuating effects of the atmosphere is given by:

$$E_{dn} = E_{ext} - Cm \quad (2)$$

where C is the atmospheric extinction and m is the relative optical air mass. The atmospheric extinction brings the number of lux down to around 100,000 lux.

The total amount of energy received at ground level from the Sun at the zenith depends on the distance to the Sun and thus on the time of year. It is about 3.3% higher than average in January and 3.3% lower in July (see below). If the extraterrestrial solar radiation is 1,367 watts per square meter (the value when the Earth–Sun distance is 1 astronomical unit), then the direct sunlight at Earth's surface when the Sun is at the zenith is about 1,050 W/m^2, but the total amount (direct and indirect from the atmosphere) hitting the ground is around 1,120 W/m^2. In terms of energy, sunlight at Earth's surface is around 52 to 55 percent infrared (above 700 nm), 42 to 43 percent visible (400 to 700nm), and 3 to 5 percent ultraviolet (below 400nm). At the top of the atmosphere, sunlight is about 30% more intense, having about 8% ultraviolet (UV), with most of the extra UV consisting of biologically damaging – short wave ultraviolet.

Direct sunlight has a luminous efficacy of about 93 lumens per watt of radiant flux. This is higher than the efficacy (of source) of artificial lighting other than LEDs, which means using sunlight for illumination heats up a room less than fluorescent or incandescent lighting. Multiplying the figure of 1,050 watts per square meter by 93 lumens per watt indicates that bright sunlight provides an illuminance of approximately 98,000 lux (lumens per square meter) on a

perpendicular surface at sea level. The illumination of a horizontal surface will be considerably less than this if the Sun is not very high in the sky. Averaged over a day, the highest amount of sunlight on a horizontal surface occurs in January at the South Pole.

Dividing the irradiance of 1,050 W/m^2 by the size of the Sun's disk in steradians gives an average radiance of 15.4 MW per square meter per steradian. Multiplying this by π gives an upper limit to the irradiance which can be focused on a surface using mirrors: 48.5 MW/m^2.

2. Sunlight velocity

Einstein's crucial breakthrough about the nature of light, made in 1905, can be summed up in a deceptively simple statement: The velocity of light is constant [7]. So, what does this sentence really mean?

Surprisingly, the answer has nothing to do with the actual speed of light, which is 300,000 kilometers per second (186,000 miles per second) through the "vacuum" of empty space. Instead, Einstein had an unexpected - and paradoxical -insight: that light from a moving source has the same velocity as light from a stationary source. For example, beams of light from a lighthouse, from a speeding car's headlights and from the lights on a supersonic jet all travel at a constant rate as measured by all observers - despite differences in how fast the sources of these beams move.

The Special theory of relativity is based on Einstein's recognition that the speed of light does not change even when the source of the light moves. Although it might seem logical to add the speed of the light source and the speed of the light beam to determine the total speed, light does not work this way. No matter how fast Einstein rides his bike, the light coming from his headlight always moves at the same speed.

Firstly, the answer that it takes light from the Sun 8m 20s to reach Earth is derived by dividing the distance from the Sun to Earth – around 150 million kilometres – by the speed of light, which is around 300,000 km/s.

3. Variable sunlight velocity

Sunlight is electromagnetic waves. Light spread from the Sun to the Earth and their quant, photon can be described as the following equation;

$$\frac{\partial \rho}{\partial t} + c_x \frac{\partial \rho}{\partial x} + c_y \frac{\partial \rho}{\partial y} + c_z \frac{\partial \rho}{\partial z} + \sum_{i=1}^{n} \frac{\partial (c_i \rho)}{\partial \xi_i} - D_f \left(\frac{\partial^2 \rho}{\partial x^2} + \frac{\partial^2 \rho}{\partial y^2} + \frac{\partial^2 \rho}{\partial z^2}\right) - \rho g + (R_i) = 0 \quad (3)$$

where ρ - quant density probability (random), c - sunlight velocity, D_f - diffusion coefficient, g - gravity acceleration, R_i reactions on the Sun, x, y and z space coordinate, ξ attribute of interest, and t is time.

Sunlight is chaned in space and time to the Earth and can sate that sunlight velocity is not constant. Also, sunlight spread on the Earth is not stationary.

Energy which Sun is emitted can be described as:

$$\rho c_p \left(\frac{\partial T}{\partial t} + c_x \frac{\partial T}{\partial x} + c_y \frac{\partial T}{\partial y} + c_z \frac{\partial T}{\partial z} + \sum_{i=1}^{n} \frac{\partial (c_i T)}{\partial \xi_i}\right) - \lambda_c \left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} + \frac{\partial^2 T}{\partial z^2}\right) + S_R = 0 \quad (4)$$

where T temperature probability (random), c sunlight velocity, λ_c conductivity coefficient, S_R heat generation, x, y and z space coordinate, ξ attribute of interest, and t is time.

The equations (3) and (4) the first time derived in the previous paper [8].

4. 5G and 6G networks

6G is expected to support 1 terabyte per second (Tbps) speeds. This level of capacity and latency will be unprecedented and will extend the performance of 5G applications along with expanding the scope of capabilities in support of increasingly new and innovative applications across the realms of wireless cognition, sensing and imaging. 6G's higher frequencies will enable much faster sampling rates in addition to providing significantly better throughput. The combination of sub-mm Wave (e.g. wavelengths smaller than one millimeter) and the use of frequency selectivity to determine relative electromagnetic absorption rates is expected to lead to potentially significant advances in wireless sensing solutions.

Additionally, whereas the addition of mobile edge computing - MEC is a point of consideration as an addition to 5G networks, MEC will be built into all 6G networks. Edge and core computing will become much more seamlessly integrated as part of a combined communications/computation in frastructure framework by the time 6G networks are deployed. This will provide many potential advantages as 6G technology becomes operational, including improved access to artificial intelligence - AI capabilities.

6G is expected to launch commercially in 2030. 6G is being developed in response to the increasingly distributed radio access network - RAN and the desire to take advantage of the terahertz - THz spectrum to increase capacity and lower latency. While some early discussions have taken place to define 6G, research and development - R&D activities will start in earnest in 2020. Many of the problems associated with deploying millimeter wave radio for 5G new radio are expected to be solved in time for network designers to address the challenges of 6G. It's expected that 6G wireless sensing solutions will selectively use different frequencies to measure absorption and adjust frequencies accordingly. This is possible because atoms and molecules emit and absorb electromagnetic radiation at characteristic frequencies and the emission and absorption frequencies are the same for any given substance [9]-[12].

5. Radiation energy

The word quantum derives from the latin, meaning "how great" or "how much". The discovery that particles are discrete packets of energy with wave-like properties led to the branch of physics dealing with atomic and subatomic systems which is today called quantum mechanics. In physics, a quantum (plural quanta) is the minimum amount of any physical entity (physical property) involved in an interaction. The fundamental notion that a physical property can be "quantized" is referred to as "the hypothesis of quantization". This means that the magnitude of the physical property can take on only discrete values consisting of integer multiples of one quantum. For example, a photon is a single quantum of light or of any other form of electromagnetic radiation. Similarly, the energy of an electron bound within an atom is quantized and can exist only in certain discrete values. Indeed, atoms and matter in general are stable because electrons can exist only at discrete energy levels within an atom. Quantization is one of the foundations of the much broader physics of quantum mechanics. Quantization of energy and its influence on how energy and matter interact (quantum electrodynamics) is part of the fundamental framework for understanding and describing nature.

Basic problem in classic physics and chemistry was consideration that emission, transfer and absorption electromagnetic waves (radiation) performed continues.

Quant mechanical moving of electrons in atoms make magnetic field permanent feromagnets. Electrical particles with spin also have magnetic moment. Some electrical neutral particles, for example neutron, which have spin, also have magnetic moment because of distribution electricity in their inner structure. Particles without spin never have magnetic moment.

The magnetic field of permanent magnets can be quite complicated, especially near the magnet. The magnetic field of a small straight magnet is proportional to the magnet's strength (called its magnetic dipole moment). The equations are non-trivial and also depend on the distance from the magnet and the orientation of the magnet. For simple magnets, m points in the direction of a line drawn from the south to the north pole of the magnet [13]-[17]. Flipping a bar magnet is equivalent to rotating its m by 180 degrees.

The magnetic field of larger magnets can be obtained by modelling them as a collection of a large number of small magnets called dipoles each having their own m. The magnetic field produced by the net magnetic field of identical (to a multiplicative constant) so that in many cases the distinction can be ignored. This is particularly true for magnetic fields, such as those due to electric currents, that are not generated by magnetic materials.

Equation of electron, quant moving in magnetic field can be expressed as [6],[8]:

$$v = \frac{dx}{dt}, F_M = m\frac{d^2x}{dt^2} \qquad (5)$$

$$m\frac{dv}{dt} = mg + mv_r + R \qquad (6)$$

$$m\frac{dv}{dt} = F_M \qquad (7)$$

where x - path, v electrons velocity moving, m - electron mass, g - gravity acceleration, v_r -friction acceleration, t - time, F_M - electromagnetic force and R -random force.

In this way is defined magnetic force and magnetic moment [6], [18]-[21]. By equation (6) can control and seek out conditions for wished force of magnetic field. If more magnetic field fixed in set, then is obtained resulted magnetic force as shown in equation (6).

$$F_M = F_{M_1} + F_{M_2} + F_{M_3} + ...F_{M_N} \ , \qquad (8)$$

Magnetic force F_M is expressed in SI system in unit (N) Newton.

In this paper equations for electromagnetic field were extended for random force.

In classical physics and chemistry is opinion that electromagnetic waves emission, transfer and absorption are performed continuous. Maks Plank introduce assumption that electromagnetic radiation emitted in discrete energy quantity called energy quant [6]. It means energy emitted discontinuously, with break, in energy package. Energy of one quant proportional is frequency radiation f :

$$\varepsilon = hf = h\frac{c}{\lambda} \qquad (9)$$

where $h = 6.62\ \ 10^{-34}\ \ Js$ universal Plank's constant, c light velocity, f frequency and λ wave length of electromagnetic waves which emitted.

The photon energy formula $\varepsilon = hf$ is used to compute radiant energy in joules based on Planck's constant and a frequency of radiation in hertz.

Einstein is proved Plank's hypothesis on quant applying to describing photo effect. Einstein extended Plank's hypothesis that energy electromagnetic radiation transferring in quant to some obstacle which it absorbed. Instead, Plank's name quant (small pieces), Einstein suggested name photon (light pieces) [7]. Idea about photons (quant) means the following: electromagnetic waves energy has discontinuous structure. These small energy pieces are relying photons (quant). Plank's formulae for energy one photon shows that different electromagnetic waves have photons non-equal energy. Since photon's energy in opposition proportion with radiation waves length then minimal energy of photons have electromagnetic waves with maximum waves length, and such as radio waves, until maximum photons energy has path of specter which have minimal waves lengths and those are cosmic waves.

If electromagnetic waves emitted in the form of quant, with that energy each quant $\varepsilon = hf$, then all emitted energy:

$$E = nhf \qquad (10)$$

where $n = 1,2,3,4,....$

Acording this equation (10) follows that:

- The smallest energy which can emitted equal energy one quant (energy cannot be less from this energy but cannot be emitted).
- All amount emitted energy must be equal integer product of multienergy of one quant.

Equation (9) can be written in the following form:

If $\omega = 2\pi f \quad f = \frac{\omega}{2\pi}$

$$\varepsilon = h\frac{\omega}{2\pi} = \frac{h}{2\pi}\omega = h^{\bullet}\omega \qquad (11)$$

$$h^{*} = 1.05\ \ 10^{-34}\ Js$$

where h^{*} also Plank's constant.

Electromagnetic waves emitted in the form of quant, with total emitted energy $E = nhf$ to the final product. When these quant energies are high density then becomes substance. Thus, substance is high density energy.

The quant energy term can be derived according to following equation:

$$\Delta p \Delta q = \varepsilon \Delta t \qquad (12)$$

where p probability of position, q is probability of time, ε is quant energy and t is time. This formula includes no determine principle. Vibration change can be defined as:

$$\Delta f = \frac{\varepsilon}{h} \qquad (13)$$

where f frequency.

Like other waves, electromagnetic waves have properties of speed, wavelength, and frequency.

To set the start frequency is very important. The maximum stop frequency can measure by the measurement hardware.

Discussion

On Earth, sunlight is scattered and filtered through Earth's atmosphere as daylight when the Sun is above the horizon. Sunlight takes about 8.3 minutes to reach Earth from the surface of the Sun. A photon starting at the center of the Sun and changing direction every time it encounters a charged particle would take between 10,000 and 170,000 years to get to the surface.

Variable sunlight velocity through space and time was analyzed and can state that light is not constant. Sunlight spread to the Earth is not stationary.

This paper contributed the hypothesis of quantization, and a photon as a single quantum of light or of any other form of electromagnetic radiation.

The equation of electromagnetic field was extended for random force.

Conclusions

In this paper the changeable light velocity was examined. The equations for sunlight spread were discussed.

Sunlight velocity and illuminance were examined. Electromagnetic radiant energy and quantum energy were analyzed and discussed.

Expression for electromagnetic field was extended. Quantum electrodynamics of energy and its influence on how energy and matter interact is part of the fundamental framework for understanding nature.

Abbreviation

AI - artificial intelligence
EM - electromagnetic waves
EMR - electromagnetic radiation
DNA - deoxyribonucleic acid
MEC -mobile edge computing
LED - light efficacy density
RAN - radio access network

R&D - research and development
UV - ultraviolet

Notation

c - light velocity, km / s
C - the atmospheric extinction, lux
E_{sc} - illuminance constant, lux
E_{ext} - extraterrestrial solar illuminance, lux
g - gravity acceleration, m / s^2
F_M - magnetic force, N
$h = 6.62 \ \ 10^{-34}$ Js -universal Plank's constant
lux - $lumen / m^2$
m - mass
p - probability of position
q - probability of time
R - random force, N
t - time, s
v - electrons velocity moving, m / s
v_r - friction velocity, m / s

Greek symbols

ε - quant energy, J
λ - wave length, m
f - frequency, s^{-1}

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