Dual Natures of Light and Electromagnetic Fields

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Abstract

The wave-particle dual nature of light was discovered from experimental observations and from theoretical works of Max Planck and Albert Einstein during the beginning of the twentieth century. This paper reveals that wave-particle duality is just one aspect of the *all dual* nature of light (electromagnetic waves) and electromagnetic fields and that light and electromagnetic fields manifest dual natures in other ways also. For example, light is not only a local phenomenon as conventionally viewed, but also a non-local phenomenon. Light behaves both according to ether theory and emission theory. The speed of light is both constant (c) and variable ($c \pm V$). The phase velocity of light is independent of source and observer velocity and is always constant c, while the group velocity of light varies with observer velocity but is independent of source velocity. Light acts as if it travels both in a straight line and in curved path, at the same time! Electrostatic lines of force behave as if they are both straight and curved lines. Electrostatic fields behave as if they 'propagate' both at the speed of light and with infinite speed, at the same time! This paper is a summary of the findings reported in previous papers published by this author. An extensive theoretical research carried out by this author in an attempt to explain the Michelson-Morley experiment, the Sagnac effect and other light speed experiments led to uncovering of the broader and more fundamental nature of duality in electromagnetism.

Introduction

The nature of light and electromagnetic fields remains to be one of the most confusing and formidable problems in science, much of which this author claims to have solved in paper[1]. The problem of the nature of light manifests itself in two seemingly unrelated areas: quantum mechanics and the problem of the speed of light. The wave-particle dual nature of light was discovered from experimental observations and from theoretical works of Max Planck and Albert Einstein during the beginning of the twentieth century. The problem of quantum mechanics (wave-particle duality) was observed in double-slit experiments and the problem of the speed of light was observed in the Michelson-Morley and other light speed experiments. Physicists generally presume (tacitly) that these two problems are unrelated and some physicists who ever ask if there is any connection between the two face a formidable theoretical gap. For example, some authors commented that Einstein's Special Relativity theory is not compatible with his work on photo-electric effect. Einstein did not try to connect (or was unable to connect) the photon concept with the problem of the speed of light.

I carried out an extensive theoretical research on the speed of light[1], which was aimed at solving the puzzle of the Michelson-Morley experiment, the Sagnac effect and other light speed experiments. After years of work, I was able to formulate a successful theoretical model, which I

called Apparent Source Theory[1], that explains the Michelson-Morley experiment, the Sagnac effect and many other light speed experiments. The research not only resulted in a successful theoretical model of the speed of light, it also revealed a fundamental nature of light and electrostatic fields: duality. So far only one aspect of this dual nature of light is known to physicists: wave-particle duality. This paper summarizes the findings in my previous papers[1] about other aspects of duality in electromagnetism. Next we will briefly introduce aspects of dual natures of light and electromagnetic/electrostatic fields.

Dual natures of light and electromagnetic fields

Wave-particle nature of light

As observed in double slit experiments, light behaves both as if it is a wave and as if it is a particle.

Local and non-local nature of light and electromagnetism

Light behaves both as if it is a local phenomenon and as if it is a non-local phenomenon, at the same time!

Constant phase velocity and variable group velocity of light

The speed of light is both constant (c) and variable ($c \pm V$). The group velocity of light behaves in the conventional way: it varies with observer velocity but does not vary with source velocity. The phase velocity of light behaves in an unconventional way: it is constant c independent source or observer velocity.

Emission theory and ether theory of light

Light behaves both according to ether theory and according to emission theory[1]. Conventional ether theory and conventional emission theory are wrong. The ether does not exist, nor does light behave according to conventional ballistic theory. A correct theory of light is a fusion of ether theory and emission theory[1].

Finite and infinite 'speed ' of electrostatic fields

Electrostatic fields behave as if they are transmitted both at the speed of light and at infinite speed.

Straight line and curved path of light and electrostatic fields

Light behaves as if it travels both in a straight line and in curved path. Electrostatic lines of force behave as if they are both straight and curved.

For an (absolutely) co-moving light source and observer, light travels from the *apparent* source to the observer in a straight line, but travels from the *real* source to the observer in curved path [1].

For an absolutely co-moving electric charge and observer, the electric line of force comes in a straight line from the *apparent* charge, but in a curved path from the *real* charge.

If absolutely co-moving charge and observer suddenly accelerate, there will be an apparent change in position of the charge (behind the real charge position) as if the electrostatic field was transmitted at the speed of light but the apparent change in position of the charge (hence change in the field strength and direction) will be observed *instantaneously*.

Thanks to God and the Mother of God, Our Lady Saint Virgin Mary

References

1. Absolute Motion, the Speed of Light, Electromagnetism, Inertia and Universal Speed Limit *c* – Apparent Change of Source Position Relative to Co-moving Observer, Vixra, by Henok Tadesse