Contiguously aligned electric fields provide mechanism to replicate Newtonian instantaneous influence-at-a-distance

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Abstract: The structure of helical electromagnetic waves, with a longitudinal component, provides a mechanism that can account for Newtonian gravity instantaneous influence-at-a-distance. Basic electromagnetic principles applied to helical electromagnetic field structures identify a contiguous alignment from the point of origination to the point where the electromagnetic field has propagated. Once the electromagnetic field has propagated at the speed of light from the source to some point, the influence of the field-to-field coupling may not be limited to the speed of light.

Keywords: contiguous alignment, electromagnetic, handedness, helical, Newtonian gravity, speed of light,

I. Introduction

Newtonian gravity contains an enigma that constantly hangs over the current curved space-time theory of gravity. Newtonian mechanics, when applied to calculating the orbits of planetary objects and trajectories of spacecraft, does not require a distance/speed-of-light factor. A satisfactory explanation for Newtonian gravity instantaneous influence-at-a-distance has not been provided, fitting in the same category as the phenomenon often described as *spooky instantaneous action-at-a-distance*. There still are efforts to link gravity to the Coulomb force, but how it can provide an attractant only force has defied a rational explanation.

Researchers have demonstrated that propagating electromagnetic fields can attract and repel each other.[1][2] The parallel transverse electromagnetic (TEM) waves experienced bending perpendicular to their axis of propagation, and the attraction or repelling is based upon electric and magnetic field principles. The significance of the experiments affirms that propagating electric and magnetic fields, well removed from their original sources, obey the same physical laws that were first identified in laboratory experiments on steady state electric and magnetic fields some 170 years ago. The experiments that demonstrated the bending required precise alignment of the electric and magnetic fields using a coherent electromagnetic (EM) source. However, the attraction or repelling of properly aligned propagated EM fields demonstrates they replicate a Coulomb type force mechanism.

At the time the current theory of gravity was presented, the only EM field orientation known was where both the electric and magnetic field vectors were transverse to the axis of propagation, and this field orientation cannot present a Coulomb like force in the direction of the axis of propagation. It has been known for a long time that there are structures in the universe, small and large, with spin and helical shapes.[3]

Photonics researchers are producing helical type electromagnetic field structures that have longitudinal components that create helicoid like fields.[4][5] The mathematical models of helical EM (HEM) field structures identify angular position specific phases. An EM field generated in the form of a helicoid has been modeled by a number of organizations.[6]–[8] The American Institute of Physics helicoid rendition, where they choose to model an electric field in the form of a helicoid, uses color to illustrate the phase changes. Whether an electric or magnetic field, the phases of the helical fields will be angularly fixed relative to the HEM source orientation.

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A helicoid presents a chiral form to an identical helicoid with the same handedness when they are at 180° to each other.[9][10] The Wolfram source noted that the helicoid is the only non-rotary surface that can roll along itself.[11] Chirality is a property of a helix, and a helicoid is what is termed a “filled-in” helix. The chirality of the helical waveform gives it special characteristics. All of the photonics references provide images of a helicoid that are solid to the center, this due to the apparatus used to produce the helicoid shaped wavefronts. A helicoid with a hole is known as Hoffman’s minimal surface.[12]

II. Helical Field Coordinates

The electric and magnetic fields of an EM wave have to be at 90° to each other, but this does not preclude one of them from being parallel to the axis of propagation. This allows a HEM wave to have two possible field structure orientations.

Cylindrical coordinates, Fig. 1, are used to represent the orientation of HEM fields. For this discussion the magnetic field vector has been given the symbol M_H to represent the *magnetic field direction* relative to the cylindrical surface, with the subscript H indicating the field has a helical structure. M_H will be restricted to being transverse to the axis of propagation, z, which allows the electric field vector E to be either transverse, E_H, or parallel, E_C, to that axis. The subscript C denotes a cylindrical field structure. A HEM waveform can have a field structure with a pair of helicoid fields, HEM-HH, M_H and E_H, or with a helicoid and cylindrical field, HEM-HC, M_H and E_C.

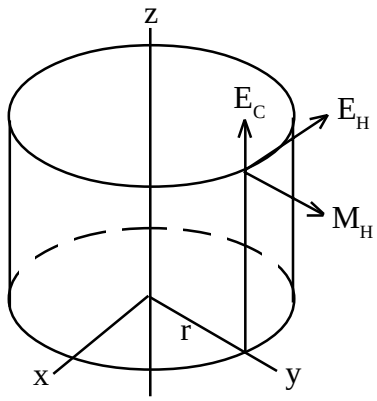

Fig. 1 - Cylindrical Coordinates Depicting Helical Electromagnetic Field Vectors

From the viewpoint of an observer looking toward the source of a HEM-HH wave, both field vectors, M_H and E_H, will be transverse to the axis of propagation with the E_H vector presenting azimuthal polarization. A HEM-HC would present a hybrid form, the M_H vector will be transverse, and the E_C vector appearing as a superimposed cylindrical ring, parallel to the axis of propagation, presenting longitudinal polarization. An individual working in atmospheric sciences has produced a graphical image of a column surrounded by a helicoid, which is representative of the shapes of the HEM-HC fields.[13]

III Angular Specific Phase Positions

The helicoid and cylindrical field polarities will have specific angular positions. Fig. 2 illustrates the angular positions of the electric field polarity, E_C, when it is the longitudinal component of a HEM-HC field where the axis of propagation, Z, is into the paper away from the viewer.

Both the HEM-HH and HEM-HC waveforms based upon a helix present a chiral form. For an HEM wave, this presents a condition where two identical HEM waves at 180° to each other, with the same handedness, will allow chiral coupling of the fields; Fig. 2 illustrates this for the electric field of an HEM-HC waveform where flipping the image over by 180° will result in the positive and nega-

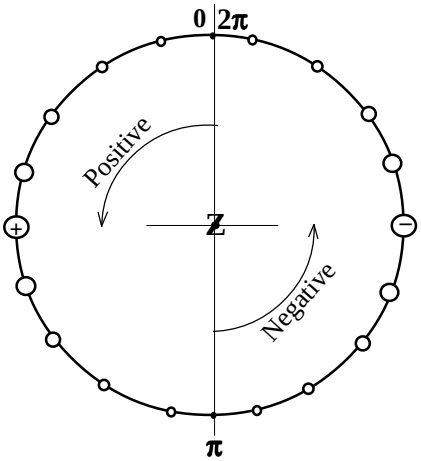

Fig. 2 Cylindrical Electric Field Identifying angular position specific plus and minus phases

tive field of one aligning with the negative and positive of the other. The same will happen with the magnetic poles of the helicoid fields, they will align with their opposite poles. The HEM-HC field configuration will produce an attractant force to an identical EM field of the same type at 180°, mimicking the force of gravity.

IV. Contiguous Alignment

The HEM-HC wave will propagate at the velocity of light, and, for a continuously emitting source, this presents continuity from the point of emission to the point to where the wave has propagated. On the cylindrical surface the electric field is a series of plus and minus fields evenly spaced on their respective sides of the cylinder by the pitch of the helix parallel with the axis of propagation. Fig. 3 illustrates an alignment where the vertical separation, pitch, of the helix loops has the same value as the helix circumference. The HEM-HC will have contiguous alignment of the electric field from the point of origination to the position where the field has propagated, and this alignment will present the appearance of a Coulomb force.

For two HEM-HC fields at 180° to each other, with the same handedness, the chiral coupling would be the result of two pairs of electric fields, and two pairs of magnetic poles. Although the two pairs of magnetic poles have transverse field vectors, it is not known if the chiral coupling of two helicoids would result in more than a trivial influence in the longitudinal direction. The chiral coupling between contiguously coupled EM fields could provide a simple explanation for the force of gravity, but would require new inquiries to identify the quantum mechanism that produces it.

For a HEM-HC field the radius will be a function of the wavelength and pitch. Changing the pitch will not affect the propagation velocity, but it would change the field-to-field coupling distances of the longitudinal electric fields and the coupling influence.

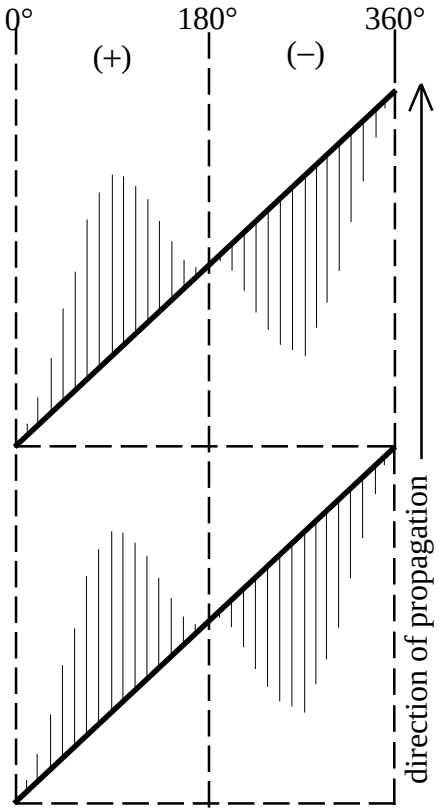

Fig. 3 - Cut and flattened cylinder surface depicting two complete cycles of an electric field having longitudinal polarization

The contiguous alignment of the HEM-HC electric fields can provide the mechanism for Newtonian gravity instantaneous influence-at-a-distance, at least within the confines of the solar system; the actual velocity of the influence will have to be determined by measurement. A reference summarizes astronomical sources that estimate a value of greater than $2*10^{10}c$ for the Newtonian gravity influence velocity.[14] The influence transfer does not have an infinite velocity, it just appears so within the confines of the solar system. It will be necessary to make measurements to determine the influence delay in a chain of continguously coupled electric or magnetic fields. It may be necessary to improve the precision of timing systems to measure the delay, and this can be aided by a concept identified in a paper titled, “A methodology to define physical constants using mathematical constants.”[15]

V. Conclusion

Two identical helical electromagnetic waves at 180° to each other will provide an attractant only

chiral coupling, which will give the appearance of a Coulomb force. The contiguously aligned electric fields could provide the mechanism for Newtonian gravity instantaneous influence-at-a-distance action. The HEM fields are spatially angular position specific. Techniques will have to be developed to distinguish HEM from TEM waveforms. Sensor structures will be needed that can efficiently acquire HEM wave forms with longitudinal polarization, as well as providing a degree of shielding from TEM wave forms. The source to source influence delay of contiguously coupled fields needs to be measured.

If gravity is the result of HEM-HC field structures, that could provide an explanation for the helical and spiral structures, small and large, in the universe.

References

[1] Tang, Hong, et.al., Harnessing optical forces in integrated photonic circuits, Nature, pp 480-484, issue 27 November 2008 http://discovermagazine.com/2010/jan-feb/083/

[2] Wan, W., et. al., Time-Reversed Lasing and Interferometric Control of Absorption, Science, Vol. 331 no. 6019 pp. 889-892, Feb. 18, 2011 DOI: 10.1126/science,1200735 http://spectrum.ieee.org/semiconductors/optoelectronics/antilaser-invented/

[3] Whyte, Lancelot Law , "Chirality", Leonardo, Vol. 8, pp 245-248 Pergamon Press 1975 http://geomsymm.cnsm.csulb.edu/courses/303/reading/whyteChirality.pdf

[4] Barbieri, n., et.al., "Double helical laser beams based on interfering first-order Bessel beams" J. Opt. Soc. Am. A Vol 28, Issue 7, pp. 1462-1469 Jul. 2011 DOI: 10.1364/JOSAA.28.001462

[5] Zhan, Q. "Cylindrical Vector Beams From Mathematical Concepts to Applications" (Doc. ID 101448); published January 29, 2009 http://www.scribd.com/doc/45118150/Cylindrical-Vector-Beams-From-Mathematical-Concepts-to-Applications

[6] American Institute of Physics, Physics News Graphics, February 24, 2005 http://www.aip.org/png/2005/229.htm

[7] Torner, L., et.al., "Digital spiral imaging," Opt. Express Vol 13, Issue 3, 873-881 (2005) doi:10.1364/OPEX.13.000873 http://www.opticsinfobase.org/oe/abstract.cfm?URI=oe-13-3-873

[8] Courtial, J., and Padgett, M., http://www.physics.gla.ac.uk/Optics/play/photonOAM/

[9] Weisstein, E."Handedness." From MathWorld--A Wolfram Web Resource. http://mathworld.wolfram.com/Handedness.html

[10] Weisstein, E."Chiral." From MathWorld--A Wolfram Web Resource. http://mathworld.wolfram.com/Chiral.html

[11] Weisstein, Eric W. "Helicoid." From MathWorld—A Wolfram Web Resource. http://mathworld.wolfram.com/Helicoid.html

[12]Weisstein, Eric W. "Hoffman's Minimal Surface." From MathWorld--A Wolfram Web Resource http://mathworld.wolfram.com/HoffmansMinimalSurface.html

[13] Chu, Kwang-Hua W., "Possible Structures of Sprites", arXiv:physics/0609157v1 [physics.gen-ph] 19 Sep 2006, http://arxiv.org/pdf/physics/0609157v1

[14] Walker, W.D., "Superluminal Electromagnetic and Gravitational Fields Generated in the Nearfield of Dipole Sources", http://arxiv.org/abs/physics/0603240v1 (see page 30)

[15] Makinson, F.H. "A methodology to define physical constants using mathematical constants", IEEE Potentials July/August 2011, Vol. 30 Issue 4, pgs 39-43, DOI 10.1109/POT.2011.940377