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New Horizons for the $\overline{B} \times \overline{V}$ Theory of Gravity

W. J. Hooper

During World War II, the writer, with student assistants, was engaged in a project to make a drift and ground speed meter for aircraft. It was to operate by translation of the device across the vertical component of the earth's magnetic field. A voltage induced by electromagnetic induction was to be measured. The accepted theory at that time was that the $\overline{B} \times \overline{V}$ induced motional electric field would be cancelled within the aircraft by an electrostatic field from charges which would arise on the side walls of the aircraft. This theory caused the writer no little concern and he raised a question of fundamental importance to the science of physics. Can an electrostatic field arising from charges of electricity cancel a motional electric field of equal and opposite intensity arising from electromagnetic induction?

Careful analysis of the problem revealed that the electrostatic field arising from charges on the inside walls of the aircraft would be exactly equal in intensity and opposite in direction to the motional electric field due to translation across the vertical component of the earth's magnetic field. A charged particle, free to move, if placed in these two fields would be held in equilibrium, it would not move. The writer reasoned, however, that a monkey and a man could exert equal and opposite

forces on an object and hold it in equilibrium, but everyone will agree that this is no proof that a man is a monkey, or that a monkey is a man. While the apparent cancellation prevented the hoped for operation of the device, shielding experiments very carefully planned and carried out proved conclusively that the cancellation was not actual but only virtual.[1] The two electric fields are not identical in nature and they do not actually cancel each other when equal and opposite. The exciting discovery was made that the $\overline{B} \times \overline{V}$ motional electric field in these experiments was immune to every kind of shielding, magnetic or electrostatic. The field was found to suffer no diminution by shielding of any sort. The gravitational field of the earth is the only field previously known to possess this property. Immunity to shielding is its most outstanding property. Could it be that a kinship exists between the gravitational field and the motional electric $\overline{B} \times \overline{V}$ field? The writer commenced working on such a theory.

In the summer of 1957, Mr. Joel E. Fisher of Oyster Bay, Long Island, reported at the Gravity Day Meeting of the Gravity Research Foundation that he had obtained a small measurement of gravity with a gravity meter which was placed directly over a spinning rotor, consisting of permanent rod magnets arranged parallel to each other forming the outer circumference of a

1. W. J. Hooper, New Horizons in Electric, Magnetic and Gravitational Field Theory, Chapter 3, Principia College Library. To be published in 1970.

right circular cylinder in a squirrel cage fashion. The announcement of this experiment brought the writer and Mr. Fisher together in a joint research project. Several such rotors were built and gravity measurements were made. To all appearances we had experimental evidence that the motional electric field, produced over the rotors, exerted a force on the gravity meter somewhat equivalent to gravity itself. During 1958-59, Hooper and Fisher gave several papers before meetings of the American Physical Society on their experimental findings.[2] Then came the disappointment! The writer discovered that when a heavy sound absorber was placed between the rotor and the gravity meter, no measurement could be obtained! A high pitched sound alone was found to produce a deflection in the meter. Even a buzzer placed horizontally near the meter affected it. Thus our joint project collapsed. Both Mr. Fisher and I, in spite of our disappointment, believed that because of their common property of immunity to shielding, someday a relationship between the $\overline{B} \times \overline{V}$ motional electric field and gravity would be found.

Retirement from teaching has permitted the writer to pursue further the investigation of the $\overline{B} \times \overline{V}$ field. Support for continued research was found. A small corporation[3] was formed and

2. W. J. Hooper, "Equivalence of the Gravitational Field and a Motional Electric Field," Session S6, American Physical Society Meeting, Chicago, Nov. 28-29, 1958.

3. Electrodynamic Gravity, Inc., P. O. Box 1976, Sarasota, Florida. (Because the field that is generated simulates gravity).

a fresh start is well under way. The big question was how could this field be thrown out into space where it could be measured and studied? Another attempt was made to do this with a rotor made up with electromagnets. About two years ago a new vibrating capacitor electrometer of great sensitivity made its appearance.[4] With this new instrument, and also with a very sensitive oscilloscope,[5] we have been able to show, by measuring the voltage induced in the wires between two plates of an air capacitor, that a $\overline{B} \times \overline{V}$ motional electric field actually exists as a spacially distributed field in the region about the spinning magnetic rotor. This field is radially directed with respect to the axis of rotation and can be made so that it is directed either inwardly or outwardly, depending on the direction of the d. c. current sent into the rotating electromagnets comprising the rotor.

Our motional electric field research has enabled us to build a new, all electrical (no moving mechanical parts) generator of this field. In 1820 Hans Christian Oersted discovered that a magnetic field was looped about a current carrying conductor. Prior to this, electricity and magnetism were separate sciences with no relationship. His discovery served to unite them. The new generator, comprised of over four thousand parallel linear conductors, connected in series and supplied with d. c. current, demonstrates experimentally that the flux Oersted discovered is

4. Keithley 640 Vibrating Capacitor Electrometer.

5. Textronix 545B with 1A7A Plug-in.

actually in motion, as predicted by Professor C. G. Cullwick of Queens College in 1957.[6] The Oersted magnetic flux moves with the drift velocity of the electrons giving rise to it.[7] The new generator makes it possible to measure this velocity with considerable precision, thus affording new instrumentation for measuring electron drift velocity in metals, as well as the number of conduction electrons per unit volume that are available, and showing how these two quantities vary with temperature. Our generator thus provides means for obtaining such experimental information in a realm previously approached only by a highly theoretical method called Fermi-Dirac statistics.

This new generator has enabled us to make great progress in producing a spacially distributed motional electric field. Acoustical disturbances which plagued the early experiments have been eliminated completely. The magnetic field associated with a $\overline{B} \times \overline{V}$ electric field is itself very bothersome. A strong magnetic field can make it very difficult to detect and measure the intensity of the $\overline{B} \times \overline{V}$ electric field. By connecting the parallel linear conductors forming our generator in series, we have a non-inductive winding. The magnetic flux is virtually, not actually, cancelled by the superposition of fields, so that no magnetic

6. E. G. Cullwick, Electromagnetism and Relativity, p. 245, Longman, Green and Co. (1957).

7. W. J. Hooper, "Equivalence of the Gravitational Field and a Motional Electric Field," Proceedings of the Boulder Conference on High Energy Physics, p. 483, Colorado Assoc. Univ. Press, 1970.
W. J. Hooper, "The Motional Electric Field Generator," Bulletin of the American Physical Society, Series II, Vol. 15, No. 2, Feb. 1970, p. 209, JC7.

flux is measurable about the generator. The linear conductors are very carefully wound, side by side, and turned through 180° at their ends and the whole mass of them held together by epoxy in the shape of a right circular cylinder, and housed in a grounded stainless steel pail. The movement of virtual flux, with the electrons, up and down the linear conductors produces a pure motional electric field in the space around the generator, freed of magnetic and electrostatic fields. Thus the generator simulates to some extent the movement of orbital electrons in opposite directions in atoms. A negative $\overline{B}$ and a negative $\overline{V}$ in the vector product give rise to a positive $\overline{B} \times \overline{V}$ field, even as do the positive values of $\overline{B}$ and $\overline{V}$. Thus the device is unique in that its only product is the isolated $\overline{B} \times \overline{V}$ field, displaying as it does its immunity to shielding by passing through the grounded 1/8" stainless steel jacket and charging a cylindrical air capacitor placed about it, the potential difference of which is accurately measured by an electrometer. This isolated, spacially distributed motional electric field is a new comer to physics. While known in motors and generators for years, its newly discovered properties and spacial form are unique and afford a new tool, a new probe, for new and penetrating research.

When an electric field penetrates a substance as the electrostatic field does a dielectric material, it electrically polarizes it, and if the field is not uniform but diverges or converges, it acts attractively on it, sucks it into the regions of

greater field intensity. Since the motional field penetrates through all matter, such a non-uniform field, if sufficiently intense, would have to act attractively on any kind of matter, according to a well-known general theorem.[8] When we can intensify the field produced by our generator, it should readily display this property in obedience to the known law. Such an experiment is planned. We have already found that the electron drift velocity for large current densities is greater at low temperatures than it is at room temperature. If our generator were wound with superconducting wire and immersed in liquid helium, it should generate a very intense $\overline{B} \times \overline{V}$ field and readily display experimentally a simulated gravitational field. If our hopes are realized, there is, according to theory, a possibility that the weight of an object might be altered, possibly even made weightless. With an extremely intense field, theory indicates the possibility of reversing the polarization effected by gravity and thus cause the earth's field to act repulsively on it instead of attractively. This would be anti-gravity!

There already exist experimental evidences that the agency responsible for gravity is an electric field.[9] It should be

8. J. H. Jeans, The Mathematical Theory of Electricity and Magnetism, p. 125, Cambridge University Press, 1923.

9. L. Brauner, "The Effect of Gravity on the Development of Electric Potentials in Plant Tissues," Endeavor, Jan. 1969.
Gaston Burridge, "Anti Gravity," The American Mercury, June 1958.

possible to absorb this electrical energy available everywhere on the earth, and convert it into useful electrical power for the benefit of mankind.

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SUMMARY

Theoretical and experimental research into the nature of the $\overline{B} \times \overline{V}$ motional electric field has yielded results which indicate anew a possible kinship with the gravitational field. The invention of a new all electrical generator of this field makes a study of its properties possible without disturbing acoustical and magnetic effects, as are present with a magnetic rotor, and demonstrates how this field can be related to gravity by the movement of electrons alone. It also readily demonstrates the property of immunity to shielding which the $\overline{B} \times \overline{V}$ field has in common with the gravitational field.

Resume of WILLIAM J. HOOPER

William James Hooper was born in 1895 at Iron Mountain, Michigan. He worked as a telegrapher on the C. & N. W. Railway from 1915 to 1916. He graduated from the U.S. Naval Radio School at Harvard University, and served as a chief petty officer in the U. S. Naval Reserve Flying Corps during the period, 1917 to 1919.

William Hooper attended the University of California and received his A.B. degree in 1922, graduating with honors. He then received a fellowship as research assistant to the Head of the Department of Physics, and earned his Master of Arts and Doctorate in 1925, specializing in the fields of radiation and atomic structure. He was elected to membership in Sigma Xi, National Honorary Research Society, and later a Fellow in the American Association for the Advancement of Science.

Dr. Hooper served as a Professor of Physics at Battle Creek College from 1925 to 1931 and while there built up a Department of Physics with a pre-engineering program. In 1931 he joined Principia College at Elsah, Illinois, and repeated this work. He was Professor of Physics and Chairman of the Departments of Physics and Astronomy from 1931 to 1964 inclusive at Principia and has been Chairman of the Field of Mathematics and Natural Sciences, and also Chairman of the Committee on Scientific and Engineering Studies. He was awarded the Professor Emeritus status at Principia College in June 1964.

Dr. Hooper has served as a consulting physicist for several large industrial and aerospace firms. At present he is serving as Director of Research and President of Electrodynamic Gravity, Inc., a corporation engaged in basic research.

Dr. Hooper is a member of the American Institute of Physics, The American Physical Society, The American Association of University Professors, and the American Association of Physics Teachers. His chief fields of interest in recent years have been Solar Energy, Electrodynamics, Field Theory and Gravitation, and he has research projects underway in these fields. He has done extensive lecture work on the Principia Afield program, lecturing on the subject, "The Universe Around Us."