

## ESSAY 40: The ECE Antisymmetry Laws

The first antisymmetry law was introduced in UFT 122, where it was shown that the connection of Riemann geometry must be antisymmetric. This law follows straightforwardly from the fact that the basic quantities of Riemann geometry, curvature and torsion, are derived from an operator known as the commutator of covariant derivatives. This operator can act on a vector of any dimension in any spacetime. It can also act on any tensor. The overall result is the same, the commutator of covariant derivatives produces the Riemann curvature tensor and the Riemann torsion tensor, and the commutator isolates the geometrical connection, the connection appears as a term on its own. The lower two indices of the connection are the same as those of the commutator, so it follows immediately that the connection is antisymmetric. This could be named the first antisymmetry law, and applies to gravitation. This law implies that the Riemann torsion is always non-zero, a result that has far reaching implications throughout geometry and physics. In physics the most important implication is that the Einstein field equation is obsolete because it uses a symmetric connection and ignores torsion incorrectly. The monograph *Criticisms of the Einstein Field Equation* was developed from the finding that torsion can never be neglected in Riemann geometry. This monograph is by M. W. Evans, S. Crothers, H. Eckardt and K. Pendergast, and was published in early 2011 by Cambridge International Science Publishing.

An antisymmetric connection means that cosmology must be developed as a subject based not on curvature but on torsion. This results in four laws of dynamics which have the same format as the laws of electrodynamics. The dynamics of a spiral galaxy can begin to be addressed through the use of torsion, which gives a satisfactory overall explanation. The obsolete and geometrically incorrect Einstein field equation cannot begin to describe a spiral galaxy. To the distaste of ethical scientists this fact is covered up by the dogmatists of the twentieth century cosmology, who continue to act as if the Einstein field equation need only be tested in the solar system. It is now well known that the solar system is the least suitable place in which to test incorrect mathematics. So much for the standard model of physics. Dark matter has never been observed, and the dogmatists prefer to fill up the universe with an unobservable to using the correct geometry.

In UFT 131 and following papers by M. W. Evans, H. Eckardt and D. W. Lindstrom, the second antisymmetry law was developed and applies to electrodynamics. The same overall method is used to derive the second antisymmetry law, the use of the commutator of covariant derivatives. The U(1) gauge invariance of the now thoroughly rejected standard model was in fact based on this same commutator. In UFT 131 it was simply pointed out that the commutator is antisymmetric in its indices and that the field tensor's internal structure must be antisymmetric in consequence. This internal structure is made up of the difference of four derivatives of the four potential. In the first term the indices are  $\mu$  and  $\nu$  and in the second they are  $\nu$  and  $\mu$ . These are the antisymmetric indices of the commutator, so one term is the negative of the other.

The first major implication of this simple logic is that the U(1) gauge theory of electrodynamics becomes untenable. The second antisymmetry law is self evident, and shows that U(1) sector symmetry cannot be used in attempts to produce a grand unified theory of nature. In the language of the nineteenth century the Heaviside relations between the fields and potentials in electrodynamics must be replaced by relations based on geometry. The second antisymmetry law makes electrodynamics a theory of general relativity based on geometry, namely on spacetime torsion. The second major implication is that the new geometrically based theory of electrodynamics is controlled by antisymmetry, which introduces constraints as discussed by Eckardt, Lindstrom and Lichtenberg.

The laws of electrodynamics are the Gauss law of magnetism, the Faraday law of induction, the Coulomb law and the Ampere Maxwell law. In the new ECE theory these laws look the same, superficially, but they are written in a spacetime with torsion and curvature and are constrained by the second law of antisymmetry as developed by Eckardt and Lindstrom. They are now geometrical laws based on the philosophy of general relativity, and can be unified with the other fields of nature using the same basic geometry. There is nothing in the new theory that has not been tested experimentally, and the new theory gives many new results. In the old theory of the nineteenth century, the Maxwell Heaviside theory, there was no concept of the laws being based on geometry, they were written in the Minkowski spacetime, and obeyed the laws of special relativity, notably the Lorentz transform. The new laws are covariant under the general coordinate transformation and introduce the geometrical connection into electrodynamics, notably the Cartan spin connection.