The Landau-Lifshitz Pseudotensor - Another Meaningless Concoction of Mathematical Symbols

Stephen J. Crothers
25 January 2020
sjcrothers@plasmaresources.com

Abstract: In an attempt to make A. Einstein's General Theory of Relativity comply with the usual conservation of energy and momentum for a closed system which a vast array of experiments has ascertained, Mr. L. Landau and Mr. E. Lifshitz constructed, *ad hoc*, their pseudotensor, as a proposed improvement upon the pseudotensor of Mr. Einstein. Their pseudotensor is symmetric (Mr. Einstein's is not) and, they say, it permits a conservation law including angular momentum. That it is not a tensor is outside the very mathematical structure of Mr. Einstein's theory. Beyond that, it violates the rules of pure mathematics. It is therefore a meaningless concoction of mathematical symbols.

Proof of Another Meaningless Concoction of Mathematical Symbols

The Riemann-Christoffel symbol of the first kind, denoted by $\Gamma_{\alpha\beta\gamma}$, and of the second kind, denoted $\Gamma^{\alpha}_{\beta\gamma}$, are defined by,

$$\Gamma_{\alpha\beta\gamma} = \frac{1}{2}\left(\frac{\partial g_{\alpha\beta}}{\partial x^{\gamma}} - \frac{\partial g_{\beta\gamma}}{\partial x^{\alpha}} + \frac{\partial g_{\gamma\alpha}}{\partial x^{\beta}}\right), \qquad \Gamma^{\alpha}_{\beta\gamma} = \frac{1}{2}g^{\alpha\omega}\left(\frac{\partial g_{\omega\gamma}}{\partial x^{\beta}} - \frac{\partial g_{\gamma\beta}}{\partial x^{\omega}} + \frac{\partial g_{\beta\omega}}{\partial x^{\gamma}}\right) \tag{1}$$

Note that $\Gamma_{\alpha\beta\gamma}$ and $\Gamma^{\alpha}_{\beta\gamma}$ are not tensors and that the first is composed solely from the first dreivatives of the metric tensor, the second solely from the components of the metric tensor and their first derivatives.

The Landau-Lifshitz pseudotensor is denoted t^{ik}, defined by [1],

$$\begin{aligned} t^{ik} = \frac{c^4}{16\pi k}\{&\left(g^{il}g^{km} - g^{ik}g^{lm}\right)\left(2\Gamma^{n}_{lm}\Gamma^{p}_{np} - \Gamma^{n}_{lp}\Gamma^{p}_{mn} - \Gamma^{n}_{ln}\Gamma^{p}_{mp}\right) \\ &+g^{il}g^{mn}\left(\Gamma^{k}_{lp}\Gamma^{p}_{mn} + \Gamma^{k}_{mn}\Gamma^{p}_{lp} - \Gamma^{k}_{np}\Gamma^{p}_{lm} - \Gamma^{k}_{lm}\Gamma^{p}_{np}\right) \\ &+g^{kl}g^{mn}\left(\Gamma^{i}_{lp}\Gamma^{p}_{mn} + \Gamma^{i}_{mn}\Gamma^{p}_{lp} - \Gamma^{i}_{np}\Gamma^{p}_{lm} - \Gamma^{i}_{lm}\Gamma^{p}_{np}\right) \\ &+g^{lm}g^{np}\left(\Gamma^{i}_{ln}\Gamma^{k}_{mp} - \Gamma^{i}_{lm}\Gamma^{k}_{np}\right)\} \end{aligned} \tag{2}$$

where k in the opening denominator is a constant, c the speed of light in vacuum.

Although t^{ik} is not a tensor, Mr. Einstein's followers claim that it acts 'like a tensor' under linear transformations of coordinates, so it is, they claim, meaningful, both mathematically and physically. Since it acts 'like a tensor', a superscript can be lowered, thus,

$$\begin{aligned} t^{i}_{r} = g_{rk}t^{ik} = \frac{c^4}{16\pi k}\{&\left(g_{rk}g^{il}g^{km} - g_{rk}g^{ik}g^{lm}\right)\left(2\Gamma^{n}_{lm}\Gamma^{p}_{np} - \Gamma^{n}_{lp}\Gamma^{p}_{mn} - \Gamma^{n}_{ln}\Gamma^{p}_{mp}\right) \\ &+g^{il}g^{mn}\left(\Gamma_{rlp}\Gamma^{p}_{mn} + \Gamma_{rmn}\Gamma^{p}_{lp} - \Gamma_{rnp}\Gamma^{p}_{lm} - \Gamma_{rlm}\Gamma^{p}_{np}\right) \\ &+g_{rk}g^{kl}g^{mn}\left(\Gamma^{i}_{lp}\Gamma^{p}_{mn} + \Gamma^{i}_{mn}\Gamma^{p}_{lp} - \Gamma^{i}_{np}\Gamma^{p}_{lm} - \Gamma^{i}_{lm}\Gamma^{p}_{np}\right) \\ &+g^{lm}g^{np}\left(\Gamma^{i}_{ln}\Gamma_{rmp} - \Gamma^{i}_{lm}\Gamma_{rnp}\right)\} \end{aligned} \tag{3}$$

and then this can be contracted 'like a tensor', to produce an invariant t, thus,

$$\begin{aligned} t = t^{i}_{i} = \frac{c^4}{16\pi k}\{&\left(\delta^{l}_{k}g^{km} - g^{lm}\right)\left(2\Gamma^{n}_{lm}\Gamma^{p}_{np} - \Gamma^{n}_{lp}\Gamma^{p}_{mn} - \Gamma^{n}_{ln}\Gamma^{p}_{mp}\right) \\ &+g^{il}g^{mn}\left(\Gamma_{ilp}\Gamma^{p}_{mn} + \Gamma_{imn}\Gamma^{p}_{lp} - \Gamma_{inp}\Gamma^{p}_{lm} - \Gamma_{ilm}\Gamma^{p}_{np}\right) \\ &+g^{kl}g^{mn}\left(\Gamma_{klp}\Gamma^{p}_{mn} + \Gamma_{kmn}\Gamma^{p}_{lp} - \Gamma_{knp}\Gamma^{p}_{lm} - \Gamma_{klm}\Gamma^{p}_{np}\right) \\ &+g^{lm}g^{np}\left(\Gamma^{i}_{ln}\Gamma_{imp} - \Gamma^{i}_{lm}\Gamma_{inp}\right)\} \end{aligned} \tag{4}$$

where δ^{l}_{k} is the Kronecker delta*.

* $\delta^{l}_{k} = 1$ when $k = l$, but $= 0$ when $k \neq l$

From eqs.(1) it is easily seen that the invariant eq.(4) is a first-order intrinsic differential invariant; that is, it is an invariant composed solely of the components of the metric tensor and their first derivatives. But the pure mathematicians proved [2, 3], in 1900, that first-order intrinsic differential invariants **do not exist**. Thus, the Landau-Lifshitz pseudotensor is a meaningless concoction of mathematical symbols and therefore cannot be used to represent anything and cannot be used to do calculations; just the same as Mr. Einstein's meaningless concocted pseudotensor [4, 5]. Nevertheless, Mr. Einstein's followers sometimes use it, instead of Mr. Einstein's, to represent the energy-momentum of his gravitational field and hence his gravitational waves, and, miraculously, do calculations with it; a feat beyond the capacity of pure mathematics and rational thought.

General Relativity cannot localise its alleged gravitational energy, so Mr. Einstein's gravitational waves do not exist [3, 6, 7]. This is the more so since Mr. Einstein's claim [8] that form-invariance of the Theorem of Pythagoras under Lorentz transformation is form-invariance of his expanding spherical wave of light, is false. Under Lorentz transformation his spherical wave of light is an expanding translated ellipsoidal wave of light with a non-static centre [9]. Consequently the ideological and occult Theory of Relativity is logically inconsistent and therefore false [9–11].

References

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