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www.Distinti.com

Ethereal Mechanics: Transvariance

By Robert J Distinti M.S.ECE
Box 837, New Milford PA, 18834
www.EtherealMechanics.com
www.Distinti.com
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Ethereal Mechanics

ABSTRACT

Transvariance is the study of variations that occur to matter and energy under translation. Examples of Transvariances include length contraction and time dilation. Five additional Transvariances are discovered using detailed computer simulations of the Michelson-Morley experiment (MME). These new Transvariances are variations of light and electromagnetic fields which are too subtle to be realized by Einstein's primitive thought experiments.

Length Contraction and Time Dilation are described in terms of simple mechanics by applying the new Transvariances to a matter analog consisting of a system of inter-coupled charges.

No longer does simple mechanics (Newtonian Mechanics) require the "corrections" of Relativity to explain "relativistic" effects. Transvariance shows that these effects already exist in simple mechanics with analogs present in "every-day" phenomena (the analogs are demonstrated in the video series TBA).

Transvariance is a foundational component of Ethereal Mechanics which substitutes the "Space Time Fabric" of Einstein's Relativity with a dynamic fluidic medium called Ether. This new etheric medium shares only a few properties of the Luminiferous Aether of antiquity [wiki/Luminiferous_aether].

With knowledge of the mechanisms of Transvariance, the potential exists to mitigate or "work-around" such mechanisms to allow humanity to break the light barrier. That is the ultimate goal of Ethereal Mechanics and is advanced in later papers.

Ethereal Mechanics breaks the gridlock of Physics which is partially caused by the fact that Relativity is matter ambiguous. Relativity is matter ambiguous because it does not provide a model of matter and therefore cannot explain any effect involving matter. How does matter length contract? How does matter emit, or couple to, a gravitational field? Ethereal Mechanics provides a dynamic model of matter which is reactive to translational effects, inertial effects, gravity and others. The Ethereal Mechanics Model of Matter (MOM) is developed as the series of papers progress; this paper contributes the foundational logic of the MOM with regard to translational effects (Transvariances).

The next paper in this series is "Ethereal Mechanics: Gravity" which further develops the Ether model and MOM to explain the phenomenon of gravity. These models are then used in computer simulations to show the precession of the planet Mercury, the phenomenon called Stellar Aberration, the formation of Galaxies and to demonstrate a very mundane model of black holes. Ethereal Mechanics shows that the universe is sublimating with the eventual decomposition of all matter and energy into precursors. This final state of complete entropy is consistent with thermal dynamics and in direct contradiction to present cosmology which proposes an anti-entropic "Big Crunch."

Revision History
Version 0.0: draft | 1.1 Initial Release | 1.2 typo corrections, updated links

1 The Gift: Transvariance

The "Gift" is the term that that this author uses to describe a wonderful collection of properties built into the fabric of the universe that favors the technological development of rational beings. These properties allow simple experiments to produce the same results regardless of the motions of the Earth, the Solar System and the Galaxy (Celestial Mechanics). Because experiments behave as if the Earth is standing still, primitive beings are able to develop basic mechanics (Newtonian Mechanics) without interference from celestial motions which primitives had no knowledge of. The mastery of Basic Mechanics is a prerequisite to mastery of Celestial Mechanics.

The Michelson-Morley experiment (MME) was the pinnacle event that caused humans to realize the existence of the Gift. The experiment was intended to detect the motion of the Earth as it moves through the universe; however, it produced a null result in accordance with the Gift. A null result would normally indicate that the Earth is stationary. A thousand years ago, this result would be consistent with the primitive belief that the Earth was the stationary center of the universe and this result would not present a problem. In the day of the MME, humans were aware of all the compound motions of the Earth as it travels through space; therefore, the null result appears as an annoying contradiction between Celestial Mechanics and Newtonian Mechanics.

Because the Gift causes experimental outcomes not to change (invariant) as a result of motion (translation) it could have been called Translational Invariance; however, scientists chose Lorentz Invariance as the original name of this phenomena. This original name was a source of contention because things did have to change in order for experimental outcomes to remain the same.

Eventually the reconciliation of physics was provided by Einstein's Special Relativity. Relativity claims that there is variation due to translation; however, because the experiment and the observer translate together, both vary by the same amount (covariance) and therefore the observer will measure the same outcome regardless of translation. Consequently, many scientists now use the term Lorentz Covariance. A more descriptive term is Translational Covariance.

Because the terms Translational Invariance and Translational Covariance are both valid from their different perspectives and because both terms are still in circulation, this author has chosen to simplify the situation with the contraction Transvariance which refers to either or both.

Special Relativity does not replace Newtonian Mechanics; rather, it provides "corrections" to Newtonian Mechanics in the forms of Time Dilation, Length Contraction and others. The problem with Relativity is that these corrections are empiricisms rather than mechanisms. These corrections are what MUST occur to reconcile physical models with reality; however, there is no explanation of HOW length contraction occurs or HOW time dilates. Scientists seem to be content with empirical corroboration and do not seem to be interested in determining how Transvariations occur. Furthermore, the majority of scientists treat those who question the mechanism of such phenomena as heretic non-believers.

Ethereal Mechanics takes the next step by demonstrating more Transvariations inherent in the MME which have been missed by physicists. These new Transvariances are explained in terms of simple mechanics. It follows that all Transvariances are manifestations of simple mechanics; to include, Time Dilation and Length Contraction. These mechanical explanations of Transvariances render Relativity obsolete. No longer does simple mechanics need to be "corrected" by Relativity.

1.1 More History of Michelson-Morley

In the 1800s, scientists observed that light behaves exactly as a wave phenomenon. Waves require a medium in which to propagate. For example, ocean waves propagate through the medium of water, and sound waves propagate through the medium of air, etc. At first, scientist considered that air could be the medium of light, so they evacuated the air from a glass jar and found that light could pass through the vacuum.

The next logical conclusion was that there had to be a very fine material that fills the vacuous spaces around and through matter. They called this medium the Luminiferous Aether. They rationalized that this material must be able to pass completely through matter; otherwise, they would have been able to evacuate it through some mechanical means. Because this medium is able to pass completely through matter, they made two fatal assumptions that set science on the wrong track for generations. The first assumption is that because Aether can pass completely through matter that there are no significant interactions between matter and Aether. And the second assumption holds that because there are no significant interactions, that Aether must be stationary with respect to the universe. This is sensible because without significant interactions between matter and Aether then there is no way that matter in motion could “churn up” the Aether; therefore, the Aether must be as still as the surface of a pond on a windless morning.

Under the assumption that the Aether is stationary, scientists devised an experiment to measure the relative velocity of the Earth through the Aether. The name of this experiment is the Michelson-Morley experiment (MME). This experiment was not able to detect any motion whatsoever. This null result caused a ruckus among the scientific world to eventually be resolved with Special Relativity.

This paper assumes familiarity with the construction and theory of the MME. For those who are not familiar with the MME, there are plenty of online resources that are available that should be digested before continuing on. This paper only describes the scenarios, objectives and results of each of the simulations of the MME as required.

2 The Etheric Medium (The Ether)

The model of the etheric medium (Ether) is developed step-by-step over the series of papers that embody Ethereal Mechanics. In the final accounting, the majority of properties of the Ether are diametrically opposite to those of the Luminiferous Aether (Aether) of the MME era. For example, unlike the static Aether, Ether is a dynamic material which eddies and flows about the universe and has a very complex interrelationship with matter.

This paper begins with the properties of the Ether that are consistent with the old Aether which are

1) Ether is the medium of light propagation
2) Light propagates at a constant velocity relative to the Ether

The next set of properties are inferred from the above and are discussed in more detail later

3) Ether is the conveyor of electromagnetic field phenomena
4) Electromagnetic fields do not propagate faster than light with respect to the medium

The dynamic behavior of Ether is developed in later papers; for the purposes of this paper, only stationary Ether of uniform density is considered.

3 Luminous Transvariance

Luminous Transvariances are variations of the behavior of light due to translation. A well known example of a Luminous Transvariance is the Doppler Shift. The Doppler Shift is noticeable to a stationary observer as a frequency change to the light emitted by a moving luminous source. The observed frequency shift depends upon the relative speed and direction. Because of the Gift, an observer moving with the source does not notice a Doppler Shift. Again, the Gift is "at work" preventing the moving observer from detecting anything out-of-the-ordinary.

The Michelson-Morley experiment (MME) is the pinnacle demonstration of Luminous Transvariances that have gone undetected. The irony is that MME was the experiment which made scientists aware that the moving observer is at a disadvantage to detecting anything out-of-the-ordinary. A logical course of action should have been to suspect everything no matter how normal and unremarkable it seems.

The existence of Luminous Transvariances is inferred from Length Contraction and Time Dilation. If matter length contracts and time dilates, then it follows that energy must also experience Transvariations because energy is interrelated to matter and time. Energy Transvariations infer Luminous Transvariations which infer Electromagnetic Transvariations, etc. Although this logic is sound, mainstream science does not provide an explanation of how length contracts or time dilates; therefore, there is no means to infer/derive Luminous Transvariations from them. Instead, Luminous Transvariations are developed from exploring how a beam of light reflects from a moving mirror. The logic is not much more complex than that of the Doppler Shift. This phenomenon is called Transvariant Reflection.

By properly following the chain of logic from Luminous Transvariance to Material Transvariance; sensible explanations of Length Contraction and Time Dilation are revealed. It is demonstrated that Length Contraction and Time Dilation can be explained in terms of simple mechanics.

The exploration of Luminous Transvariance is served by a highly detailed simulation of the MME allowing a very fine dissection of Transvariance. At the start, Material Transvariances are used in the classic sense as a correction. Correcting for Material Transvariances enables the Luminous Transvariances to be isolated.

The simulations for this chapter are found at the Etnerealmechanics.com Patreon site [https://www.youtube.com/watch?v=_LWXeFIT-4g]. The Video contains 11 simulations that start at the given time indexes.

The Video Sequences
Video 1: Simulation 1: time 00:30. The Stationary MME
Video 1: Simulation 2: time 01:52. The Moving MME – No compensations
Video 1: Simulation 3: time 02:30. The Moving MME – Length Contraction only
Video 1: Simulation 4: time 03:32. The Moving MME – Translational Reflection only
Video 1: Simulation 5: time 04:16. The Moving MME – Length Contraction and Translational Reflection
Video 1: Simulation 6: time 05:03. The Moving MME – Y directed.
Video 1: Simulation 7: time 05:40. The Stationary Simple Wave Guide
Video 1: Simulation 8: time 06:10. The Moving Simple Wave Guide – with Contraction and Reflection
Video 1: Simulation 9: time 06:50. The Stationary Parabolic Reflection
Video 1: Simulation 10: time 07:11. The Moving Parabolic reflector – with Contraction and Reflection
Video 1: Simulation 11: time 08:03. The Moving MME – Y Directed + Contraction + Reflection + Steering

These simulations are references and described in the following subchapters.

The executable for the simulation is found at [https://www.patreon.com/posts/22830195]. The source code is available to Engineer Level Patrons and above and is available at [TBA]

3.1 The Control: The Stationary MME

Video 1: Simulation 1: Time 00:30: The Stationary MME

The development begins with the simulation of a MME stationary with respect to the medium. This represents the control experiment to which the experiments in motion must match from the point of view of the observer moving with the experiment. The simulator is scaled to normalize the speed of light to 1 and the unit of time is the period that it takes for light to move one unit of distance. The blue grid represents the frame work of the medium and each square represents one unit of distance. Figure 1 shows a screen capture of the simulation at completion. The three sets of numbers at the top represent clocks. The clocks "time dilate" with respect to their velocity relative to the Ether. Dilation is discussed in later chapters. The E number represents the units of time that have expired for a clock that moves with the Ether. The U number represents a clock that moves with the Universal reference frame. The U –Clock is redundant because the simulations used in this paper always keep the Ether at rest with respect to the Universe. The T clock is the "Train" clock. The components of the experiment are attached to the train reference frame allowing the experiment to be placed into motion. In the stationary case, the train speed is zero and the T clock will behave as the E clock because it will not experience any dilation.

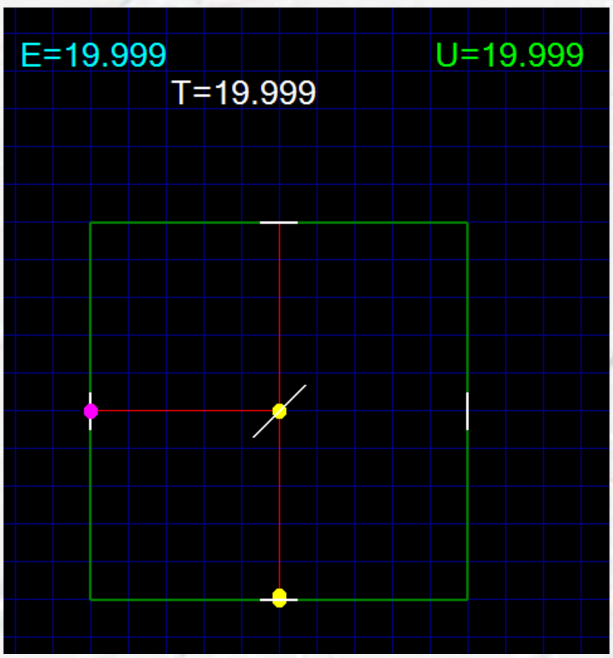


Figure 1: The Stationary MME

3.2 The Simulation Uncompensated (no Transvariance)

Video 1: Simulation 2: 01:52. The Moving MME – No compensations

The simulation demonstrates that without consideration of any Transvariations, the pulse of light reflected from the mirror would miss the top mirror.

3.3 Length Contraction Only

Video 1: Simulation 3: 02:30. The Moving MME – Length Contraction only

With only length contraction enabled, the angle of the center mirror changes such that the reflected pulse of light misses the top reflector by a wider margin than the uncompensated case.

3.4 Transvariant Reflection

The problem with legacy reconciliation of the MME is the incomplete accounting of the behaviors of light. Modern physics considers only length contraction which is a Transvariation needed to nullify fringe shift giving the appearance that the MME is stationary. This work consideration all compensations required to make the simulation match reality. From this, more Transvariations of light are revealed which lead to explanations of other phenomena to include time dilation and length contraction.

The first of these unaccounted for Transvariations is Transvariant Reflection. By considering how light reflects off a mirror in motion, it is possible to correct the problem of the beam of light missing the detector in the simulation.

Consider that a beam of light is actually a wave front of light. Figure 2 shows a beam of light incident to a reflective surface. In this figure, the wave front is divided into 4 segments to make the explanation of reflection a bit easier. In this figure the left most segment of the beam interfaces with the surface first. At a later point in time, the second segment interfaces with the surface until eventually each segment interfaces.

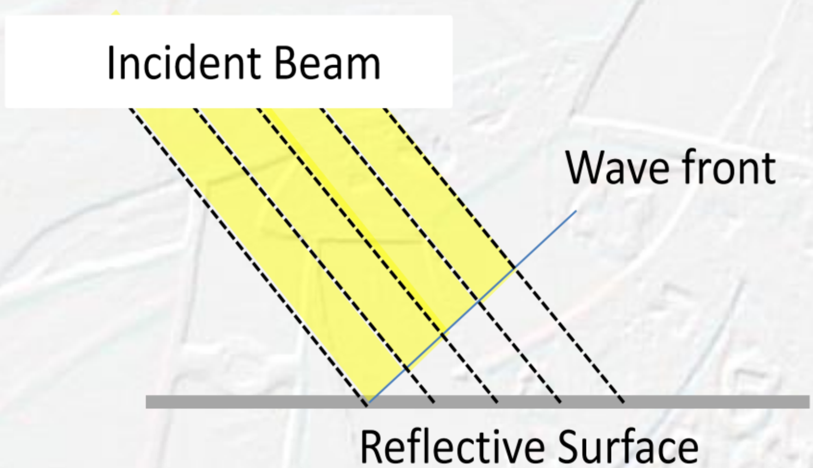


Figure 2: Incident Beam of Light

Figure 3 shows a red dashed line that represents the interface of the beam with the reflective surface as each segment makes contact. The angle of the reflected beam follows the normal behavior of reflection as conventionally understood.

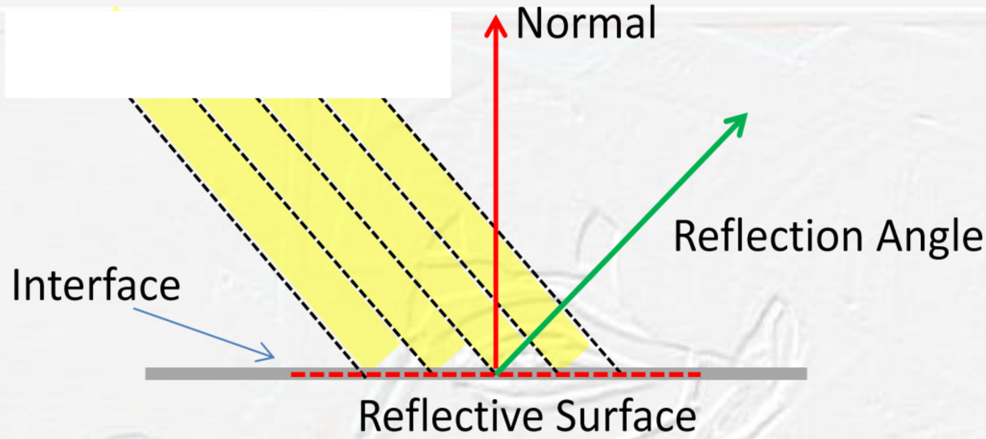


Figure 3: The Reflective Interface

Next consider the distortion of the interface caused by the surface in motion. This is demonstrated in Figure 4. As the surface moves away, it takes successively longer for each segment to make contact with the surface. This causes a distortion to the interface which causes the beam to steer to an angle other than that of the stationary case. This effect is called translational reflection or Transvariant reflection.

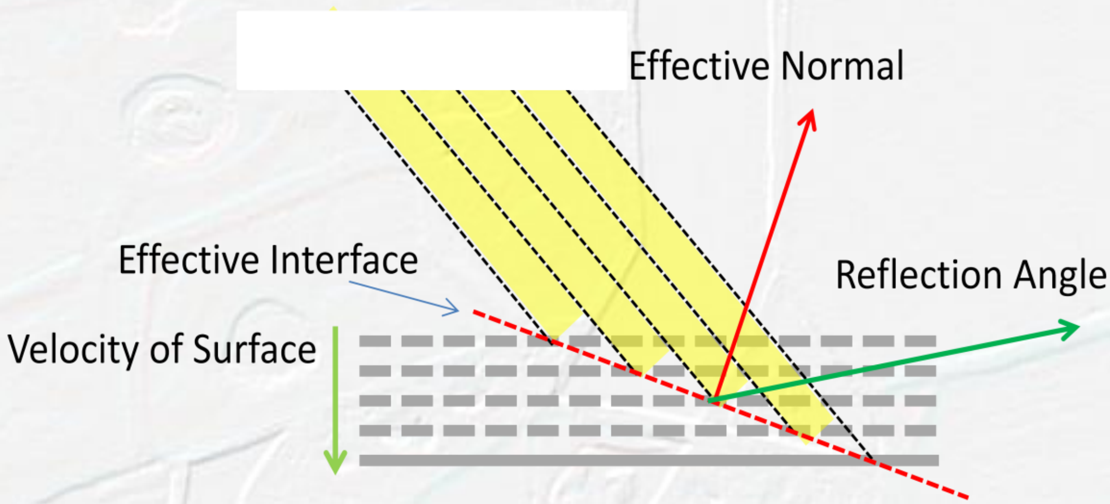


Figure 4: The interface of a surface in motion

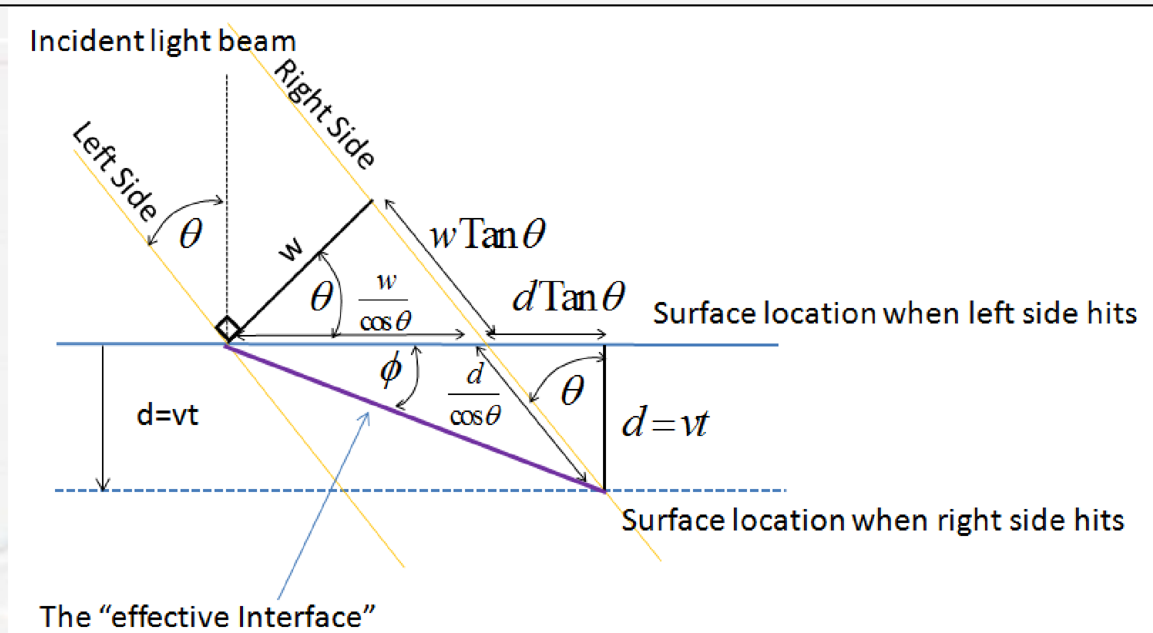


Figure 5: Parameterization of the Transvariation

Thread 1

$$ct = w\tan\theta + \frac{d}{\cos\theta}$$

$$ct = w\tan\theta + \frac{vt}{\cos\theta}$$

$$ct\cos\theta = w\sin\theta + vt$$

$$\frac{ct\cos\theta - vt}{\sin\theta} = w$$

Thread 2

$$\phi = \mathrm{atan}\left(\frac{d}{\frac{w}{\cos\theta} + d\tan\theta}\right) = \mathrm{atan}\left(\frac{\cos\theta}{\frac{w}{d} + \sin\theta}\right)$$

$$\phi = \mathrm{atan}\left(\frac{\cos\theta}{\frac{w}{vt} + \sin\theta}\right)$$

$$\phi = \mathrm{atan}\left(\frac{\cos\theta}{\frac{\frac{ct\cos\theta - vt}{\sin\theta}}{vt} + \sin\theta}\right)$$

$$\phi = \mathrm{atan}\left(\frac{\cos\theta\sin\theta}{\frac{c}{v}\cos\theta - 1 + \sin^2\theta}\right)$$

$$\phi = \operatorname{atan}\left(\frac{\cos\theta\sin\theta}{\frac{c}{v}\cos\theta - \cos^2\theta}\right)$$

$$\phi = \operatorname{atan}\left(\frac{\sin\theta}{\frac{c}{v} - \cos\theta}\right)$$

$$\phi = \begin{cases} \operatorname{atan2}\left(\sin\theta, \frac{c}{v} - \cos\theta\right) & , v != 0 \\ 0 & , v = 0 \end{cases}$$

The above computes the change in angle of the effective normal or effective interface as shown in the next Figure.

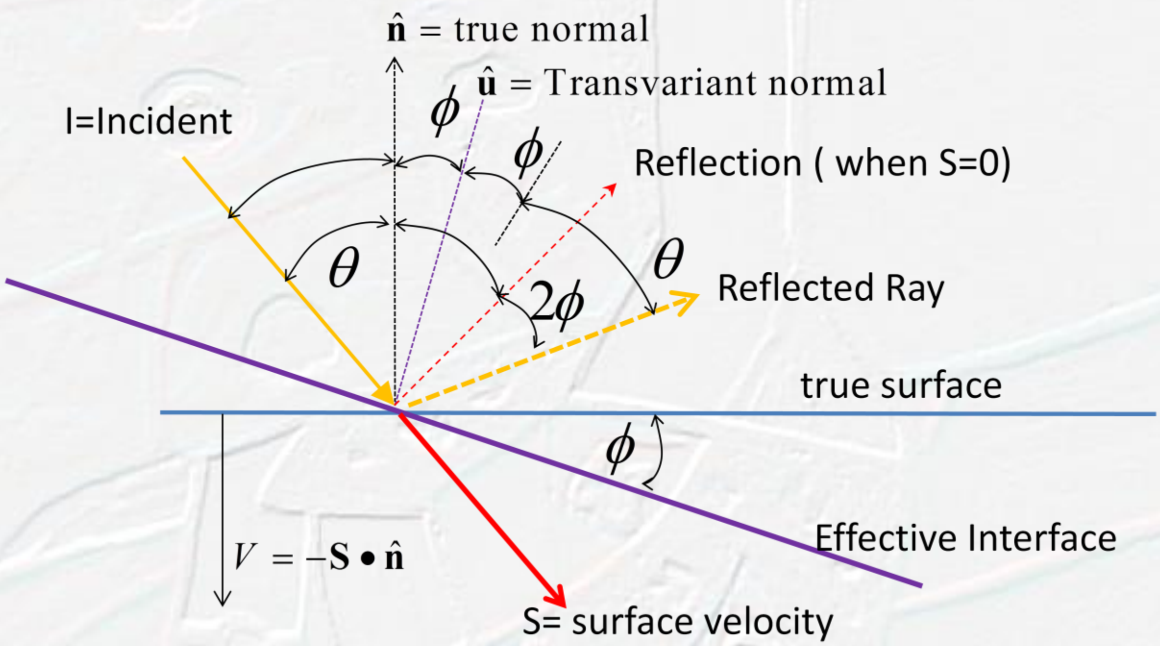


Figure 6: Interface Diagram

The above is converted into a more useful vector equation as follows

Given the following vectors definitions:

$\hat{\mathbf{n}}$ = surface normal vector

$\hat{\mathbf{u}}$ = Transvariant normal vector

$\mathbf{S}$ = Velocity of Reflective Surface

$\mathbf{I}$ = Incident Vector (Magnitude is velocity of Propagation)

$\mathbf{R}$ = Reflected Vector (Magnitude is velocity of Propagation)

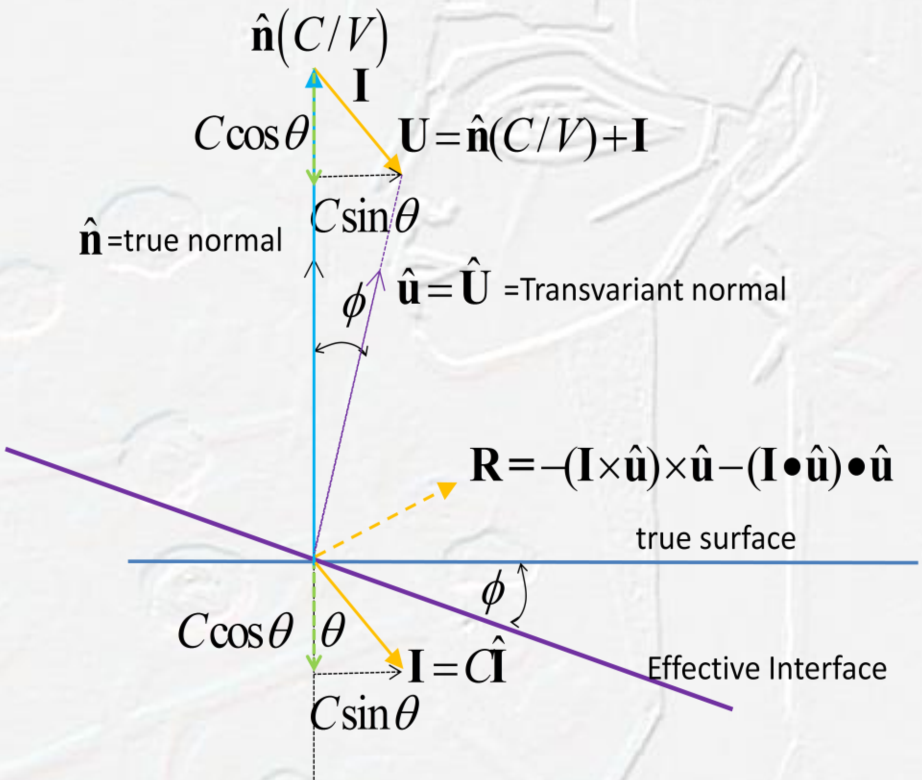


Figure 7: Simplified Vector Diagram

$$C = |\mathbf{I}|$$
$$V = -\mathbf{S} \bullet \hat{\mathbf{n}}$$
$$\hat{\mathbf{u}} = dir(\hat{\mathbf{n}}(C/V) + \mathbf{I})$$
$$\mathbf{R} = -(\mathbf{I} \times \hat{\mathbf{u}}) \times \hat{\mathbf{u}} - (\mathbf{I} \bullet \hat{\mathbf{u}}) \bullet \hat{\mathbf{u}}$$

From the above, the Transvariant normal could be expressed as:

Equation 1: Transvariant Reflection Normal (Standard Vector Algebra)

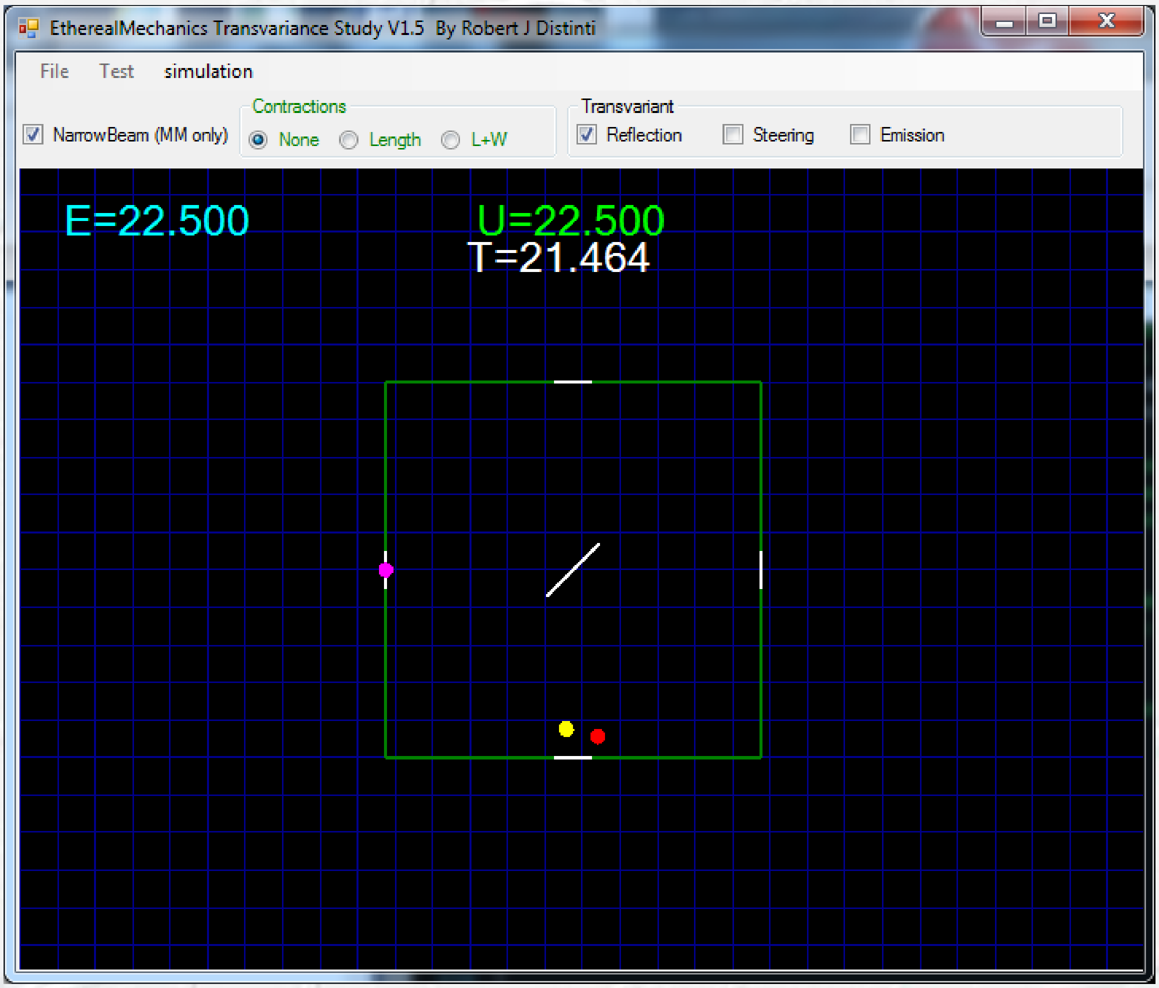
$$\hat{\mathbf{u}} = dir(\mathbf{I} - \hat{\mathbf{n}}(C/(\mathbf{S} \bullet \hat{\mathbf{n}})))$$

Where the symbol "dir" is a function that returns the direction vector of the contents within the parentheses.

3.5 Applying Transvariant Reflection only

Video 1: Simulation 4: 03:32. The Moving MME – Translational Reflection only

The simulation showing the application with Transvariant (or translation) reflection enabled only. It shows that the light beam can actually hit the reflecting plate and make it back to the detector. The problem is that the two beams do not hit everything on center and the two beams do not arrive in phase at the detector.



3.6 Transvariant Reflection and Length Contraction

Video 1: Simulation 5: 04:16. The Moving MME – Length Contraction and Translational Reflection

The simulation with both Transvariant steering and length contraction successfully completes the compensations required for the X directed (light beam emitted in the X direction) version of the MME

3.7 Y-Directed MME

Video 1: Simulation 6: 05:03. The Moving MME – Y directed.

Simulation number 6 demonstrates a MME rotated 90 degree such that the beam is emitted in the Y direction. This experiment fails (see Figure 8) because the emitted beam misses the mirror completely.

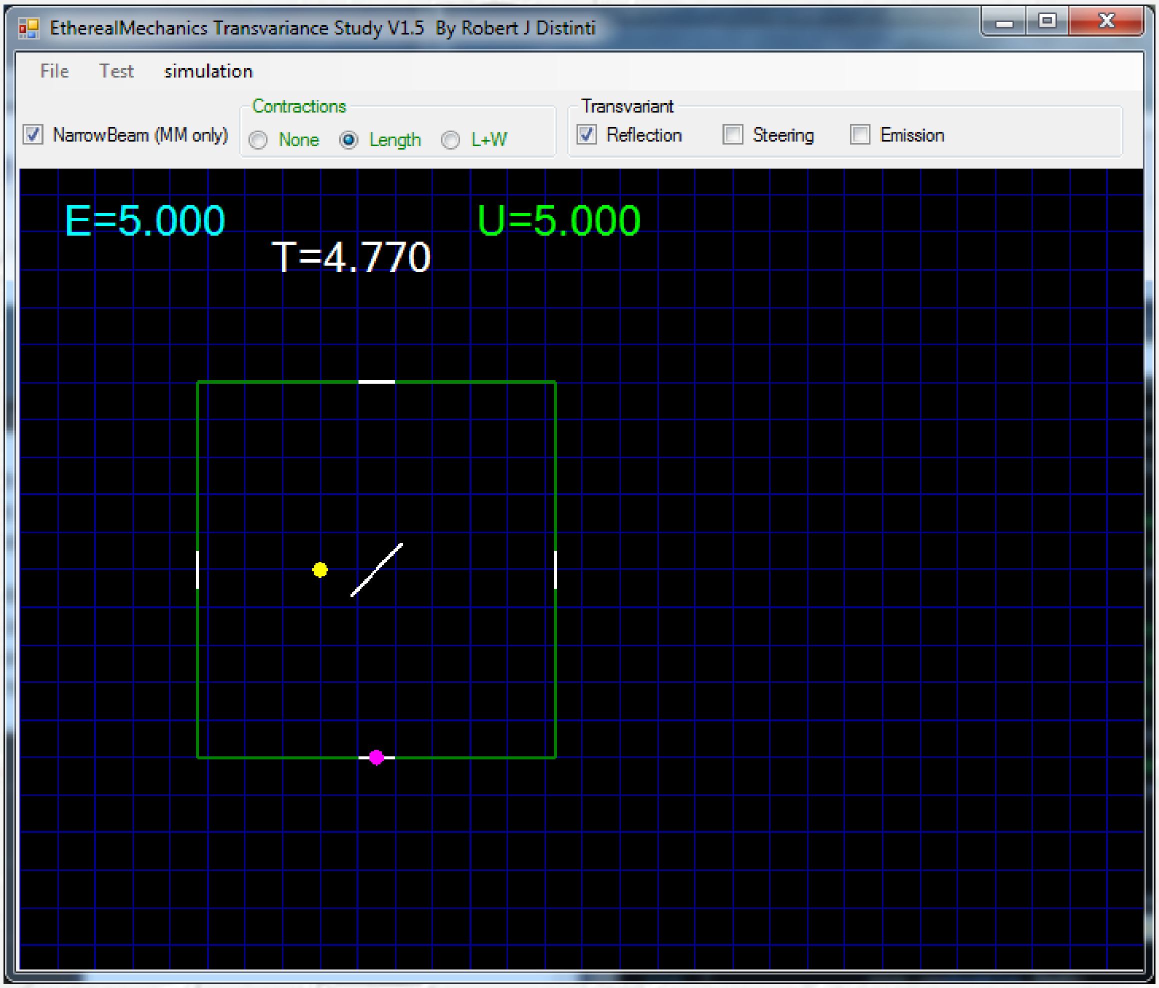


Figure 8: Y directed MME misses splitting mirror

Figure 9 (Video #1, Simulation #8) Demonstrates an emitter fashioned from an X directed source that injects into a moving corporate manifold that serves to reflect the energy to the Y direction. Because of the combined effects of Transvariant Reflection and Length contraction, the emitted waves maintain the proper angle of departure with respect to the manifold. Although a stationary observer would see the wave move in a diagonal path, an observer moving with the manifold observes the wave move away from him as if he were stationary.

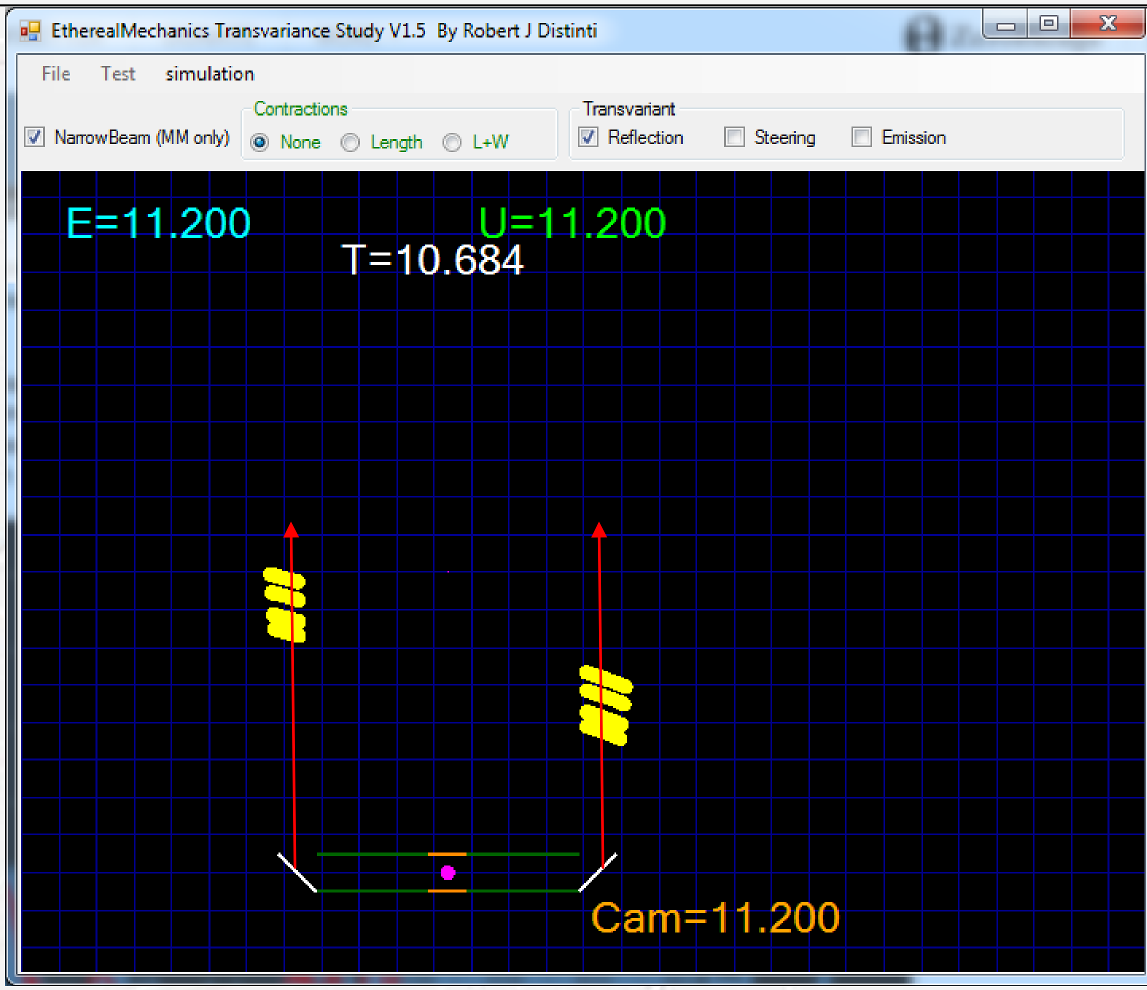


Figure 9: Y-Directed Simple Wave Guide Emitter in Motion

For thoroughness, Figure 10, demonstrates Simulation # 10 which uses a parabolic reflection to redirect energy to the +y Direction. Again the emitted waves maintain proper angle of departure with respect to the emission source/moving observer.

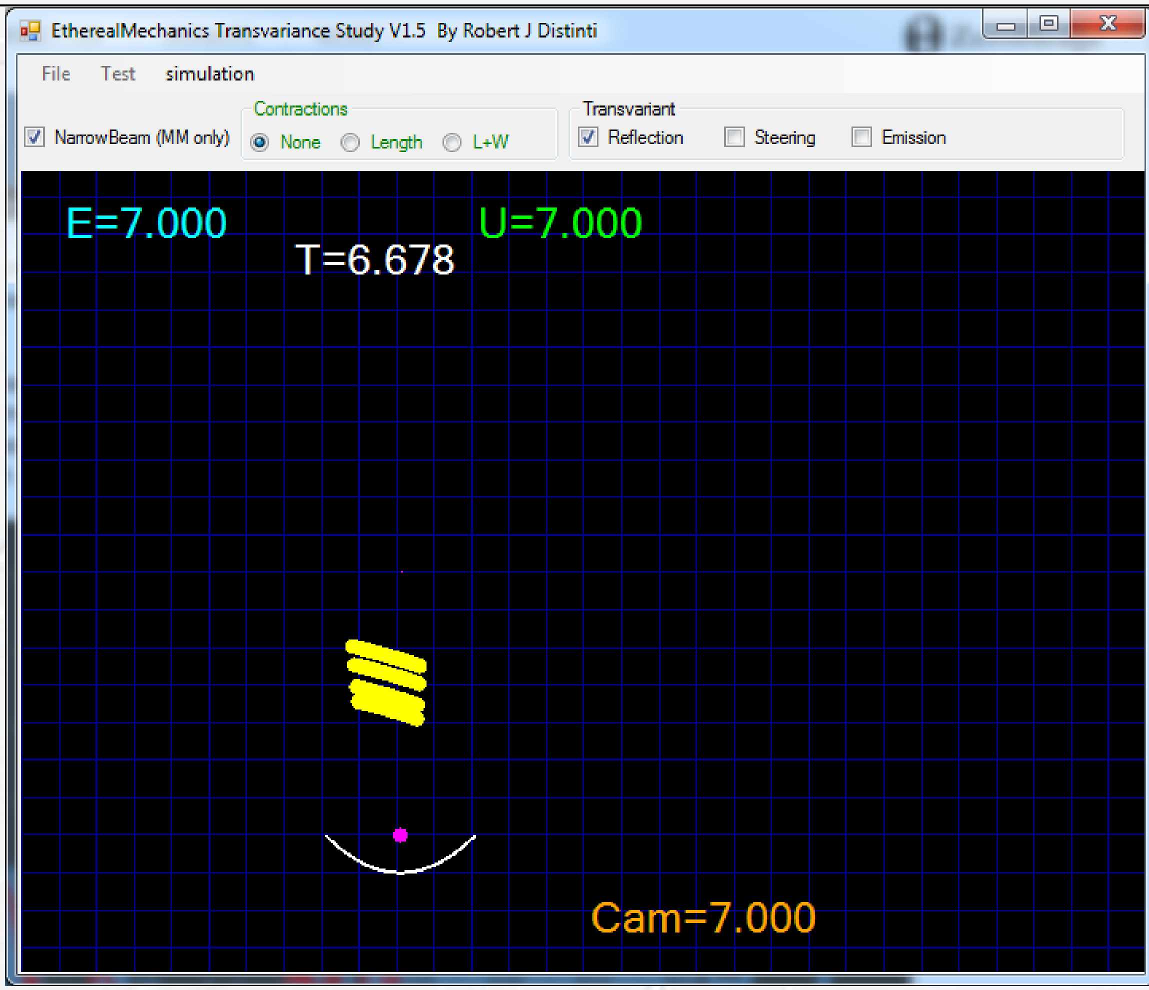


Figure 10: Parabolic Reflector in Motion

3.8 Transvariant Steering

The simulations demonstrated that beam emitters (sources) constructed from photon emitters and reflective surfaces Transvariate in such a manner that the emitted beam maintains proper departure angle with respect to the translating source. This phenomenon is called Transvariant Steering because it appears from the stationary observer's point of view, as if the source is steering the beam to compensate for translation through the medium.

It follows that any source, of any type construction, must perform this Transvariation; otherwise, the deflection of a laser beam due to translation would have been detected decades ago and it would be in violation of the Gift. Transvariant Steering may seem strange at first; however, it is expressed by other wave phenomenon. For example, the departure angle of the bow wave (wake) of a ship changes proportional to the velocity of the ship through the water.

In this section, Transvariant Steering is expressed in mathematical form based on the assumptions given above. In a later paper, the mechanism of Transvariant Steering is developed.

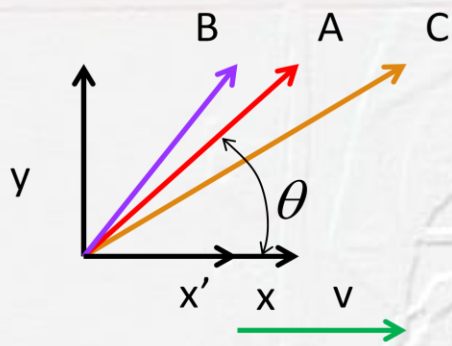


Figure 11: Setup for Transvariant Steering

Figure 11 is the setup for the derivation of the Transvariant Steering Relationship. Theta is the “aiming” angle relative to the direction of motion (V) and it represents the direction at which the source is being aimed relative to the reference frame of the source. X and Y are the components of the aiming vector **A** as observed in the reference frame of the moving source. For simplicity, the X component of the aiming vector is aligned to the direction of motion V. The vector B is the length contracted version of the aiming vector a seen by an external stationary observer. The vector C is the resultant path of the emitted beam with respect to the Ether. In this derivation the reference frame of the Ether is considered the stationary reference frame. The magnitude of C is the speed of light c. The derivation is actually computed from the stationary perspective which is C=B+V; however, B is represented in the equations in terms of A such that the resultant vector C, which is relative to the stationary perspective, is determined directly from the moving observer’s perspective.

$$v = \hat{\mathbf{V}}$$

$$\mathbf{A} = (x, y)$$

$$\mathbf{B} = (x', y)$$

$$x' = A\cos(\theta)\sqrt{1-\frac{v^2}{c^2}}$$

$$y = A\sin(\theta)$$

$$c = \sqrt{y^2 + (x'+v)^2}$$

The magnitude of the aiming vector (A) is the departure velocity. It is the velocity of the departing beam with respect to the source. The departure velocity reduces as the source velocity (V) increases. The values ‘x’ and ‘y’ are the components of the aiming vector relative to the moving source. The ‘x’ component must be affected by length contraction such that the apparent departure angle remains proper to the observer moving with the source. The value A is is determined by substituting ‘x’’ ‘y’ and ‘z’ into the expression for c and solving for A.

The quantity A resolves to the following expression. The step by step derivation is the subject of an online video [https://www.youtube.com/watch?v=vBgdiAij1gA].

$$A = \frac{1-\frac{v}{c}\cos(\theta)}{1-\frac{v^2}{c^2}\cos^2(\theta)}\sqrt{c^2-v^2}$$

There are two ways to apply the result for A, the first is to substitute back into the equations for ‘x’’ and ‘y’ to reconstruct B. This is shown in the following.

$$x' = \cos(\theta)\frac{1-\frac{v}{c}\cos(\theta)}{1-\frac{v^2}{c^2}\cos^2(\theta)}\sqrt{c^2-v^2}\sqrt{1-\frac{v^2}{c^2}}$$

$$x' = \cos(\theta)\frac{1-\frac{v}{c}\cos(\theta)}{1-\frac{v^2}{c^2}\cos^2(\theta)}\sqrt{c^2-2v^2+\frac{v^4}{c^2}}$$

$$x' = \cos(\theta)\frac{c-v\cos(\theta)}{c^2-v^2\cos^2(\theta)}\sqrt{c^4-2v^2c^2+v^4}$$

$$x' = \cos(\theta)\frac{c-v\cos(\theta)}{c^2-v^2\cos^2(\theta)}\left(c^2-v^2\right)$$

Equation 2: x component of Transvariant Steering

And the Y component is:

$$y = \sin(\theta)\frac{c-v\cos(\theta)}{c^2-v^2\cos^2(\theta)}c\sqrt{c^2-v^2}$$

Equation 3: Y component of Transvariant Steering

The above equations could probably be reduced further; however, that is a minor task left for later.

The resultant vector C is then constructed from the above as

$$\mathbf{C} = (x' + v, y)$$

The above equation is overly simplistic; however, it properly demonstrates the principle. The general solution for C is found in the following vector derivation which is valid for systems of 2D and higher.

$$\hat{\mathbf{A}} = \text{The vector direction of aim}$$

$$\mathbf{V} = \text{The vector velocity of source}$$

$$v = |\mathbf{V}|$$

$$v\cos(\theta) = \mathbf{V} \bullet \hat{\mathbf{A}}$$

$$v\sin(\theta) = \left|\mathbf{V} \times \hat{\mathbf{A}}\right|$$

$$\mathbf{A} = A\hat{\mathbf{A}}$$

$$\mathbf{B} = (\hat{\mathbf{V}} \times \mathbf{A}) \times \hat{\mathbf{V}} + (\hat{\mathbf{V}} \bullet \mathbf{A})\hat{\mathbf{V}}\sqrt{1 - \frac{v^2}{c^2}}$$

The vector expression for the emitted beam (C) with respect to the ethereal reference frame is shown in the following equation. The result is essentially V+B when V is not zero.

$$\mathbf{C} = \begin{cases} c\hat{\mathbf{A}} & v == 0 \\ \mathbf{V} + (\hat{\mathbf{V}} \times \mathbf{A}) \times \hat{\mathbf{V}} + (\hat{\mathbf{V}} \bullet \mathbf{A})\hat{\mathbf{V}}\sqrt{1 - \frac{v^2}{c^2}} & v != 0 \end{cases}$$

Equation 4: Transvariant Steering Equation (legacy vectors)

Figure 12 shows the C# implantation of Transvariant steering used in the simulation software.


```
        /// <summary>
        /// compute transvariant steered liminous emission
        /// </summary>
        /// <param name="velRelEther">vel of source relative to ether</param>
        /// <param name="emmissionDir">aiming direction (magnitude not used)</param>
        /// <param name="C">speed of emission/propegation</param>
        /// <returns></returns>
        public mVector2 computeSteering(mVector2 velRelEther, mVector2 emmissionDir, System.Double C=1) {
            if(velRelEther.squareMag()==0) return ~emmissionDir*C;
#if false     // A without length contraction
...
#endif
#if true    // A with length contraction
            mVector2 emDir=~emmissionDir;
            double VcosC= velRelEther*emDir/C;
            double V = velRelEther.mag();
            double A = System.Math.Sqrt(C*C-V*V)*(1-VcosC)/(1-VcosC*VcosC);
            mVector2 vdir=~velRelEther;
            mVector2 sinTheta=(vdir%emDir)%vdir;
            mVector2 cosTheta=(vdir*emDir)*vdir;
            mVector2  rtn=A*sinTheta+A*cosTheta*System.Math.Sqrt(1-V*V/C/C)+velRelEther;
#endif
            return rtn;
        }
```

Figure 12: C# implementation of Transvariant Steering

3.9 Y-Directed MME with Transvariant Steering

Video 1: Simulation 11: time 08:03. The Moving MME – Y Directed + Contraction + Reflection + Steering

Applying Transvariant Steering to the Beam emitter in the Y-Directed MME reconciles the Y-Directed MME.

3.10 Transvariant Diffraction and Refraction

If emitted and reflected light are affected by Transvariances, then it follows that diffracted and refracted light should also experience Transvariations. These topics are to be returned to at a later time as they are not presently required to go forward with Ethereal Mechanics.

3.11 Conclusion

In this chapter, a high fidelity simulation is used to discern the Transvariations required to compensate the MME to yield a null fringe shift as a result of translation. There are two other discrepancies in the simulation that are not related to fringe shift.

The first discrepancy is the difference in the Train Clock (T) reading between the Stationary, X directed and the Y directed experiments. The Train clock measures the observer time that elapses as the beam travels from the source until it impacts the detector plate. The clock reading for the stationary case is 20 ticks, the X directed time is 21.5 Ticks and the Y directed time is 18.5 Ticks. This problem has been resolved and is discussed in Appendix A.

The second discrepancy is the slanted wave fronts when not using a narrow beam source emitter. Because the slanted wave fronts do not affect the detected fringe shift, they are neither confirmed nor denied by the MME. It is quite possible that the Gift is not comprehensive and may exhibit subtle faults that will one day be detected. This discrepancy is to be put to the "back burner" until a later time.

4 Electromagnetic Transvariance

In the previous chapter, the behavior of composite reflector systems allowed the inference that any luminous source must exhibit translational steering (Transvariant steering). Since light is an electromagnetic emission, then it follows that electromagnetic fields must also experience Transvariations

4.1 The Electric Field (Coulomb Field)

The Coulomb field is commonly referred to as a "Static" field which is a misnomer because the Coulomb field model does not describe the nature of the "Force-At-Distance" (FAD) mechanism that cause two like charges to repel and two dislike charges to attract. In Ethereal Mechanics the mechanism of the Coulomb field is treated as an emission from a source charge that travels to infinity at the speed of light. This is analogous to a street light. To a primitive person, the luminous cone of a street light appears as a static (non-changing) illuminated volume. A light meter placed at any location in the cone shows no change over time; therefore, it is reasonable that primitive person could assume it to be static field. The modern person knows that the light is ever flowing from the bulb to infinity as the luminous energy is reflected, refracted, diffracted, and transmuted (absorbed and reemitted as heat) on its entropic journey.

4.1.1 The Static Field Paradox

The reason why a Coulomb field cannot be a static field is that a static field is a paradox. When the source of a field translates, the field must also change. This change is communicated through space as either a change in the flow of an emission (or depletion) of some material, or a propagation of a change in the state of a medium.

In either case, the emission, depletion, or propagation of state must advance outward to infinity. In fact, since charges are continually in motion, any field represents a continual outward propagation of information. The only way a field could be static is if the information traveled instantaneously to infinity. Only a null field could be a proper static field.

4.1.2 The Information Flow Field Paradigm

Because a field represents an outward flow of information from a source, we can use a spherical particle emission simulation to develop the nature of how Transvariance affect fields. The simulated particles represent only the information that flows outward which allows us to explore Transvariance without violation of conservation laws. This information is used in later papers to develop comprehensive field models which attempt to explain what actually comprises a field.

The simulation of an inverse square field such as a Coulomb field is modeled using a particle emission model as shown in the next figure.

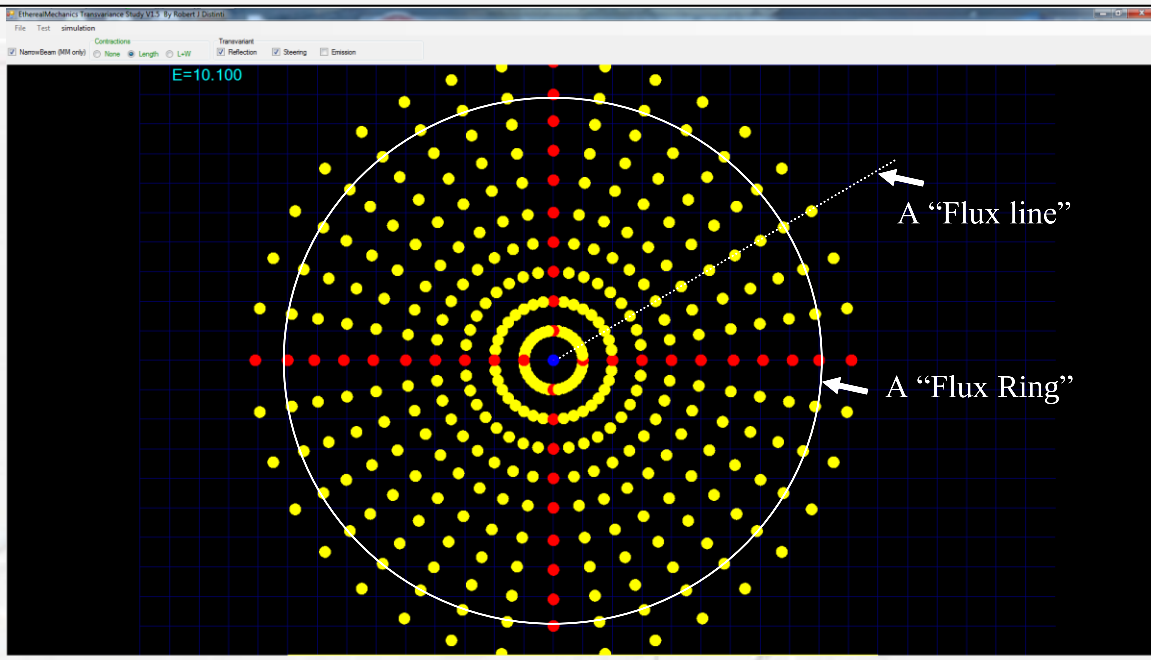


Figure 13: Particle Emission Simulation

The balls painted red are to identify the particles emitted along coordinate axes. Each radial line of emitted balls is analogous to a “Field Line” or “Flux Line” from the legacy field abstraction. Because Legacy field dynamics considered a coulomb field to be a “Static” field, only the density of flux lines was considered as a measure of the available force that could be applied to a test charge placed at a given location; however, because Ethereal Mechanics views a field as an emission, the density along the direction of flow must also be considered. Therefore, each concentric ring of balls is referred to as either a “Flux Ring” or “Field Ring.” This system allows modeling of field intensity in all three spherical dimensions instead of just two. Note: The word “ring” refers to a spherical shells of balls.

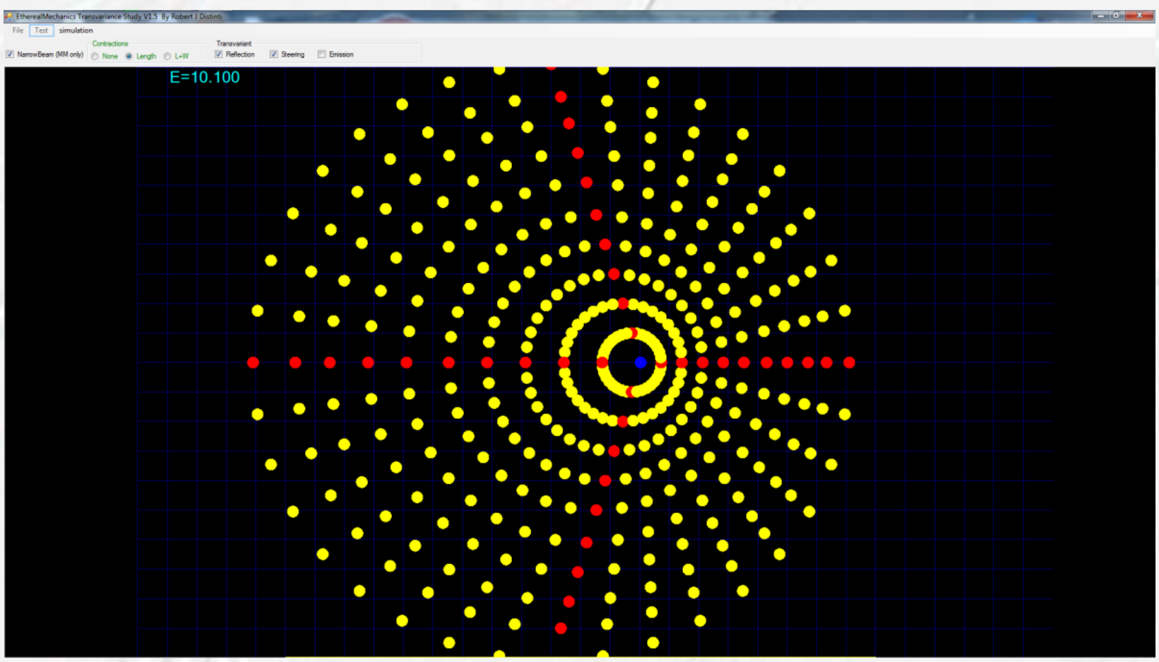


Figure 14: Distortion Due to Motion

The stationary source (Figure 13) emits field information uniformly in all directions. Assuming uniform emission under translation, results in the distorted field as shown in Figure 14.

This distortion is apparent to the moving observer in the form of "bent" field lines and a decrease in "flux" density (decrease in force) to the front and increase in force to the rear of the moving charge. According to the Gift, the observer moving with the charge must see the same field shape as if standing still.

4.1.3 Transvariant Emission (Translational Emission)

It is logical to conclude that if light exhibits Transvariant Steering, then so too should the fields that comprise light. The Transvariant Field effects are called Transvariant Emissions. The derivation for Transvariant emissions is nearly the same as that for Transvariant the Steering of luminous sources except that length contraction is not considered. The reason for this is covered on the section on Material Transvariances. Referring to Figure 15 and writing the equations without length contraction yields the following set up

Figure 15: Setup for Transvariant Emission

$$x = A\cos(\theta)$$
$$y = A\sin(\theta)$$
$$c = \sqrt{y^2 + (x+v)^2}$$

The magnitude of the aiming vector (A) is the departure velocity. The departure velocity is the velocity at which the emission moves away from the source (relative to the source).

The departure velocity is governed by the speed of light (c) and the velocity of the source (v). The departure velocity is given by the following expression. The step by step derivation is presented in the following video for those who are interested [https://www.youtube.com/watch?v=YssguP9OIAI]

$$A = \sqrt{c^2 - v^2\sin^2(\theta)} - v\cos(\theta)$$

To apply the above, the following two vector quantities must be identified

$\hat{\mathbf{A}}$ = The vector direction of aim

$\mathbf{V}$ = The vector velocity of source

$v = |\mathbf{V}|$

$$v\cos(\theta) = \mathbf{V} \bullet \hat{\mathbf{A}}$$

$$v\sin(\theta) = \left|\mathbf{V} \times \hat{\mathbf{A}}\right|$$

$$A = \sqrt{c^2 - \left|\mathbf{V} \times \hat{\mathbf{A}}\right|^2} - \mathbf{V} \bullet \hat{\mathbf{A}}$$

$$\mathbf{A} = A\hat{\mathbf{A}}$$

$$\mathbf{C} = \mathbf{V} + (\hat{\mathbf{V}} \times \mathbf{A}) \times \hat{\mathbf{V}} + (\hat{\mathbf{V}} \bullet \mathbf{A})\hat{\mathbf{V}}$$

The expression for the resultant emission vector (C) is only valid when the velocity of the source is non-zero. The value of C for all cases is

$$\mathbf{C} = \begin{cases} c\hat{\mathbf{A}} & v == 0 \\ \mathbf{V} + (\hat{\mathbf{V}} \times \mathbf{A}) \times \hat{\mathbf{V}} + (\hat{\mathbf{V}} \bullet \mathbf{A})\hat{\mathbf{V}} & v != 0 \end{cases}$$

Equation 5: Transvariant Emission Vector (legacy vectors)

Figure 16 shows the C# implementation of the Transvariant emission equation in the Transvariant simulation software. The mVector2 structure operators are overridden and have the following definitions

*= dot product
%= cross Product
!= magnitude
~= direction

```
        /// <summary>
        /// compute transvariant field emission
        /// </summary>
        /// <param name="velRelEther">vel of source relative to ether</param>
        /// <param name="emmissionDir">aiming direction (magnitude not used)</param>
        /// <param name="C">speed of emission</param>
        /// <returns></returns>
        public mVector2 computeEmmission(mVector2 velRelEther, mVector2 emmissionDir, System.Double C=1) {
            if(velRelEther.squareMag()==0) return ~emmissionDir*C;
#if true    // A without length contraction
            mVector2 emDir=~emmissionDir;
            double Vcos= velRelEther*emDir;
            double Vsin =(velRelEther%emDir).Z;
            double A = System.Math.Sqrt(C*C-Vsin*Vsin)-Vcos;
            mVector2 vdir=~velRelEther;
            mVector2 sinTheta=(vdir%emDir)%vdir;
            mVector2 cosTheta=(vdir*emDir)*vdir;
            mVector2  rtn=A*sinTheta+A*cosTheta+velRelEther;
#endif
#if false    // A with length contraction
...
#endif
            return rtn;
        }
```

Figure 16: C# code implementation of Transvariant Emission

Figure 17 demonstrates the application of Transvariant Emission to the simulation. Transvariant Emission corrects the radial orientation of field lines for both stationary and moving observer.

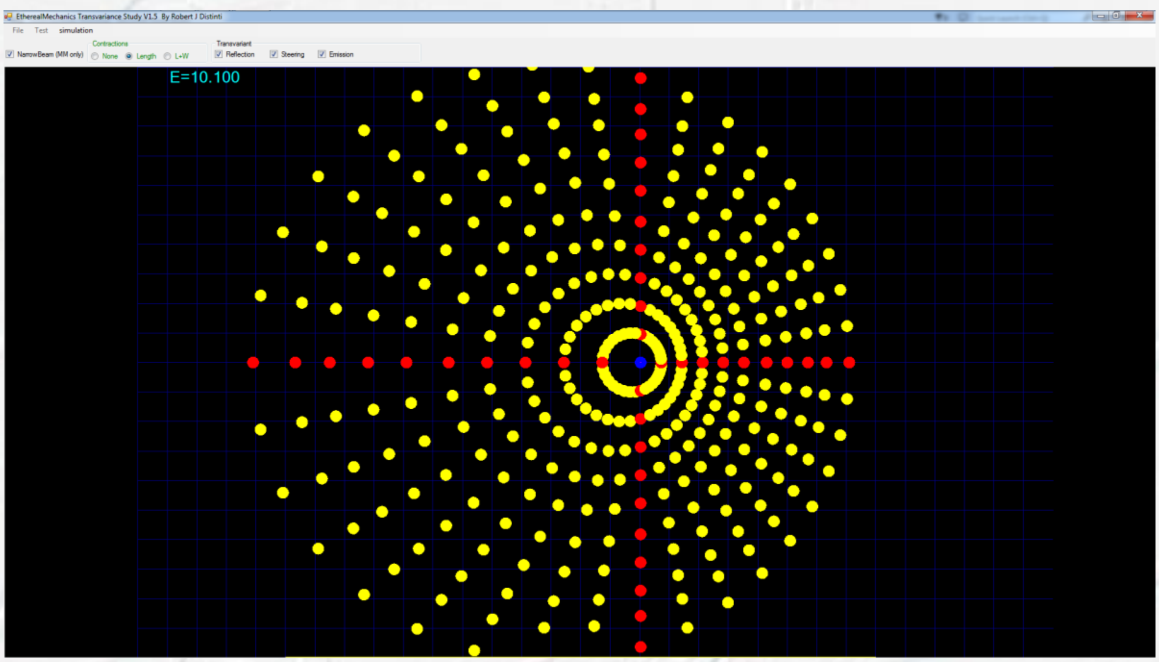


Figure 17: Field Corrected with Transvariant Emission

Transvariant Emission also corrects the flux line density fore and aft of the moving charge which gives proper flux line density in all directions and is apparent to both the moving and stationary observer. Although “flux line” density is properly compensated, there is compression of “flux rings” in front of the moving charge and thinning of rings after the moving charge.

Flux Ring distortions are compensated using the same logic as Doppler shift. A test charge moving with and in front of the source charge is retrograding away from the concentrating forward field rings, reducing the rate at which field rings couple to it; therefore, the effective force is the same as if both were stationary. The same logic applies to a parallel moving test change placed anywhere about the moving source charge.

4.2 The Magnetic Field

Shown in step 1 below is the well known motional electric model where the subscript T denotes the test or target charge that reacts to the given field.. Step 2 shows the Biot-Savart magnetic field model derived to express the field generated from a moving point charge. The subscript S denotes charge that sources the field. Step 3 substitutes step 2 into step 1 and reduces to yield step 4.

In step 5, an additional term is added to make the model agree with all reciprocal variations of the parallel wire experiments. The reason why this missing term has never been considered before is due to the fact that engineers and scientists infer the reciprocal nature by fiat application of the fundamental equations shown in step 1 and 2; therefore, the missing term has never before presented a problem.

$$1) F_T = Q_T \mathbf{V}_T \times \mathbf{B}$$

$$2) \mathbf{B} = K_M Q_S \frac{\mathbf{V}_S \times \hat{\mathbf{r}}}{\mathbf{r}^2}$$

$$3) F_T = \frac{K_M Q_S Q_T}{\mathbf{r}^2} \mathbf{V}_T \times (\mathbf{V}_S \times \hat{\mathbf{r}})$$

$$4) F_T = \frac{K_M Q_S Q_T}{\mathbf{r}^2} \left[(\mathbf{V}_T \bullet \hat{\mathbf{r}}) \mathbf{V}_S - (\mathbf{V}_T \bullet \mathbf{V}_S) \hat{\mathbf{r}} \right]$$

$$5) F_T = \frac{K_M Q_S Q_T}{\mathbf{r}^2} \left[((\mathbf{V}_T - \mathbf{V}_S) \bullet \hat{\mathbf{r}}) \mathbf{V}_S - (\mathbf{V}_T \bullet \mathbf{V}_S) \hat{\mathbf{r}} \right]$$

The preferred notation of step 5 is shown in Equation 6 which has been given the name New Magnetism.

$$F_T = \frac{K_M Q_S Q_T}{\mathbf{r}^2} \left[(\mathbf{V}_T \bullet \hat{\mathbf{r}}) \mathbf{V}_S - (\mathbf{V}_S \bullet \hat{\mathbf{r}}) \mathbf{V}_S - (\mathbf{V}_T \bullet \mathbf{V}_S) \hat{\mathbf{r}} \right]$$

Equation 6: New Magnetism (V4)

The additional term is experimentally verified and enables magnetism, in conjunction with the Coulomb field, to explain length contraction which is demonstrated in section 5.2. It should be noted that this is an earlier version of new magnetism which is sufficient for the purposes of this paper. As the series of papers commence, more developed field models are presented.

Because the above field model is developed from empirical measurements of charges in motion, it is assumed to already account for any Transvariances; however, this assumption is open for challenge.

5 Material Transvariances

In Ethereal Mechanics, Time Dilation and Length Contraction are considered Material Transvariances. In this section it is argued that Material Transvariances are governed substantially by Electromagnetism and Electromagnetic Transvariances. To argue this point, the relationship between the particles that comprise matter and electromagnetic fields is explored.

To illustrate the "emptiness" of normal matter, consider 1500 Olympic sized swimming pools filled with carbon. If the carbon were compressed such that the protons, electrons and neutrons that comprise the carbon came into contact with each other, then the resultant volume of the compressed material would be no larger than the volume occupied by an aspirin tablet. This means that there is vast empty space between each of the particles that compose matter and these particles never come into contact with each other even under extreme conditions; except possibly, those conditions where fission and/or fusion occur.

Although the tightly packed protons and neutrons in the nucleus determine the behavior of a given atom, it is the electrons, orbiting far from the nucleus, which facilitates the behavior of the atom. Electromagnetic fields substantially dominate the space between the nucleus and the electron shells; therefore, it is logical that the dominant source of material Transvariances is Electromagnetic Transvariances. There are probably Transvariances that govern the nucleus of the atom; however, that is beyond the scope of this chapter.

There is corroborating evidence which suggest that electromagnetism is the prominent factor in material behavior. Consider that chemists discuss the bonds between atoms to form complex molecules in terms of shared electrons pairs, ionic bonds, polar bonds and hydrogen bonds which are substantially electromagnetic in nature. Further consider that Electrical Engineers discuss signals and waves traveling in conductive and semi-conductive materials strictly in terms of electromagnetic fields. No other fields are even remotely discussed.

In this chapter, it is demonstrated that both Time Dilation and Length Contraction are Material Transvariances that can be described in terms of Electromagnetism and Electromagnetic Transvariances.

5.1 Time Dilation

A Light Clock constructed from two parallel opposing mirrors spaced 4 units apart is shown in Figure 18. This type of clock measures the passage of time by incrementing a counter each time the pulse of light strikes the lower plate. In the case where the clock is stationary, it takes 56 units of time for the clock to count to 7. In the case where the clock is translating at 0.3c, it takes approximately 58.7 units of time for the clock to count to 7. Note: The simulation shows 58.8 units of time due to the fact that the simulation time resolution is set to 0.1 units and the error is simply a simulation rounding error.

Because a clock constructed in this manner properly reflects the correct time in accordance with the generally understood nature of time dilation, then time dilation is completely accounted for by Transvariances described previously in this text rather than by some affectation of time itself; otherwise this system would suffer from double the effects of time dilation.

Logically then, all kinds of clocks must be affected by Electromagnetic (or other field) Transvariances rather than by some mystical affectation of time that has stranded physics for the past century.

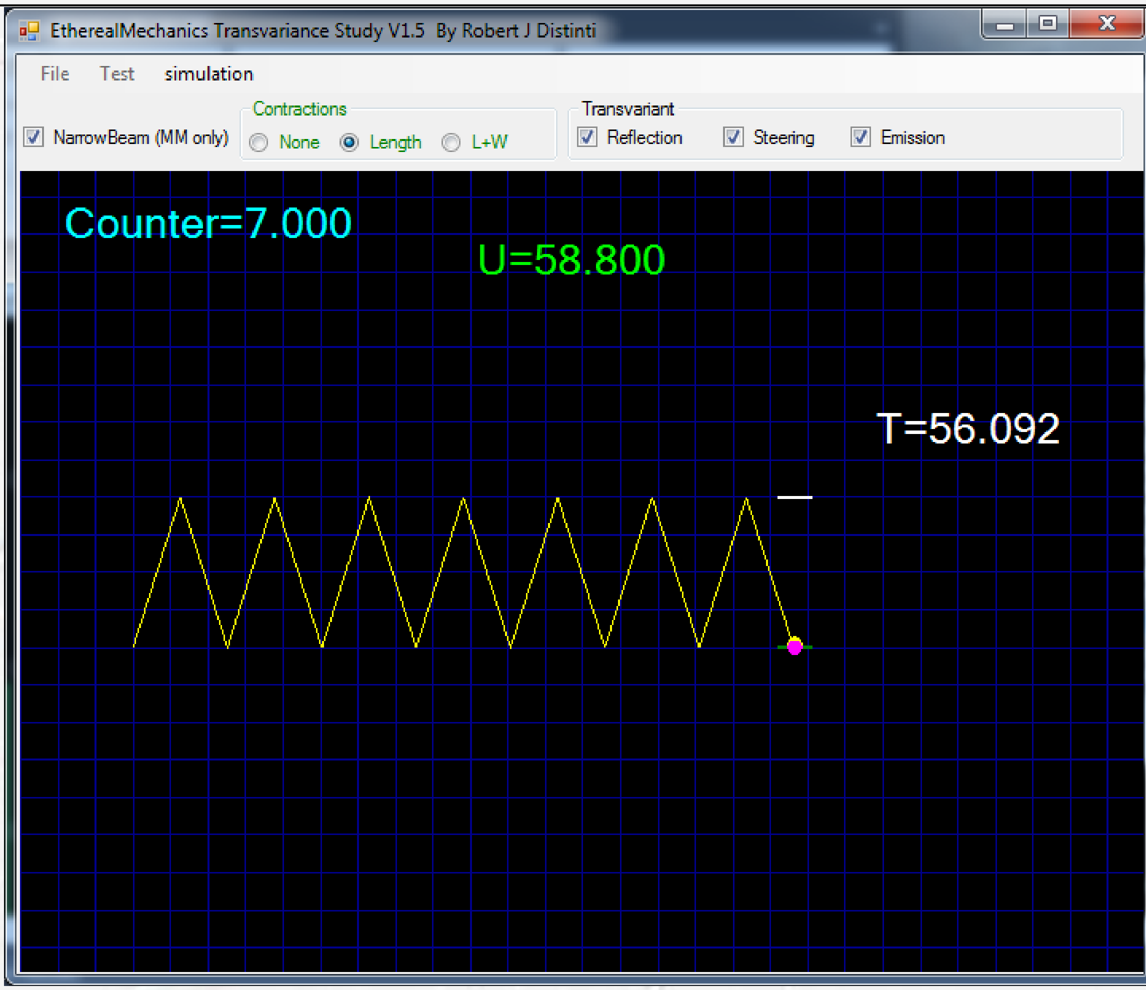


Figure 18: Light Clock

Consider that the interlocked teeth of the gears of a mechanical clock never actually touch. More specifically, the atoms of the metal teeth of two gears never touch. The force from one metal surface is conveyed to the other surface through electromagnetic fields. Because it was argued that electromagnetic fields substantially govern the behavior of matter; then, the same electromagnetic fields which govern the behavior of the light clock must also govern the behavior of matter and consequently the operation of the mechanical clock.

Time dilation is actually a "dilation" of material processes; or more properly, a Material Transvariance. In later papers, material process dilation is derived directly from more developed models of matter and field theory.

5.2 Length Contraction

Length contraction is another material process governed by electromagnetism. For the most simplistic understanding of length contraction, matter could be modeled as an array of charges. The Equation in step 1 below is Coulomb's model. Because Transvariances compensate for coulombs model, it is the same model regardless of translation. Step 2 shows the pertinent term of magnetism from Equation 6 that remains in the case where the velocity of all charges is the same (Vs=Vt). Step 3 sums the forces together and reduces. Step 5 assumes the charges move in parallel; therefore reducing all velocities to v to yield the charge to charge effects shown in step 6.

$$1)F_T = K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2} = K_M c^2 \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2}$$

$$2)F_T = -K_M \frac{Q_S Q_T}{\mathbf{r}^2}(\mathbf{V}_S \bullet \mathbf{V}_T)\hat{\mathbf{r}}$$

$$3)F_T = K_M c^2 \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2} - K_M \frac{Q_S Q_T}{\mathbf{r}^2}(\mathbf{V}_S \bullet \mathbf{V}_T)\hat{\mathbf{r}}$$

$$4)F_T = K_M \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2}(c^2 - (\mathbf{V}_S \bullet \mathbf{V}_T))$$

$$5)F_T = K_M c^2 \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2}(1 - \frac{v^2}{c^2})$$

$$6)F_T = K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2}(1 - \frac{v^2}{c^2})$$

Step 7 shows the stationary field effect (v=0) while step 8 shown the Transvariant field effects marked with the prime (‘) symbol to keep them separate. Step 9 sets 7 and 8 equal to each other.

$$7)F_T = K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2} \qquad v = 0$$

$$8)F'_T = K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}'^2}(1 - \frac{v^2}{c^2})$$

$$9)K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}^2} = K_E \frac{Q_S Q_T \hat{\mathbf{r}}}{\mathbf{r}'^2}(1 - \frac{v^2}{c^2})$$

$$10)\frac{1}{\mathbf{r}^2} = \frac{(1 - \frac{v^2}{c^2})}{\mathbf{r}'^2}$$

To arrive at Equation 7, step 10 is solved for the ratio of the Transvariant charge spacing (r') to the static charge spacing (r) required to obtain maintain equality. This compression of the charges due to translation is consistent with contemporary understanding of material behaviors.

$$\frac{r'}{r} = \sqrt{1 - \frac{v^2}{c^2}}$$

Equation 7: Field Derived Length Contraction

The variable 'v' represents the velocity of the system relative to the etheric medium.

This simplified abstraction for matter unfortunately shows length contraction occurring in all directions (length and width contraction). For completeness, other variations of contraction were simulated but only the generally excepted length contraction properly reconciles the MME and the Clock Times. .

This derivation represents the very first rational explanation of length contraction. This derivation is made possible by the corrected magnetic field model called "New Magnetism" which is shown in Section 4.2. New Magnetism includes an additional term which brings it into compliance with all legacy experiments. This additional term yields a spherical field instead of the torroid (donut) shaped field of the legacy Biot-Savart model. The legacy model exhibits a cross product relationship (Vxr) between the velocity of a source charge (V) and a vector to space (r). This relationship provides for no field energy behind the moving charge or in front of the moving charge; therefore, a derivation performed with the legacy models exhibit width contraction and not length contraction.

This derivation represents a step in the right direction. As the series of papers progress, more developed models of matter and field theory are presented which reconcile this problem.

6 Conclusion

Relativity tries to simplify the explanation of the Gift by considering only the relative motion between observers and the observed; however, this leads to ambiguity. For example, in the Twin Paradox, one twin remains stationary and the other twin travels at relativistic speeds. Because the Twins are traveling at different speeds, then the two twins should age at different rates due to time dilation; however velocity is a relative term which means velocity must be measured relative to something else. If you choose to measure the velocity of the twins relative to each other then both will have relativistic speeds and both will experience time dilation and age the same amount which contradicts Relativity and is the basis for calling this thought experiment a Paradox.

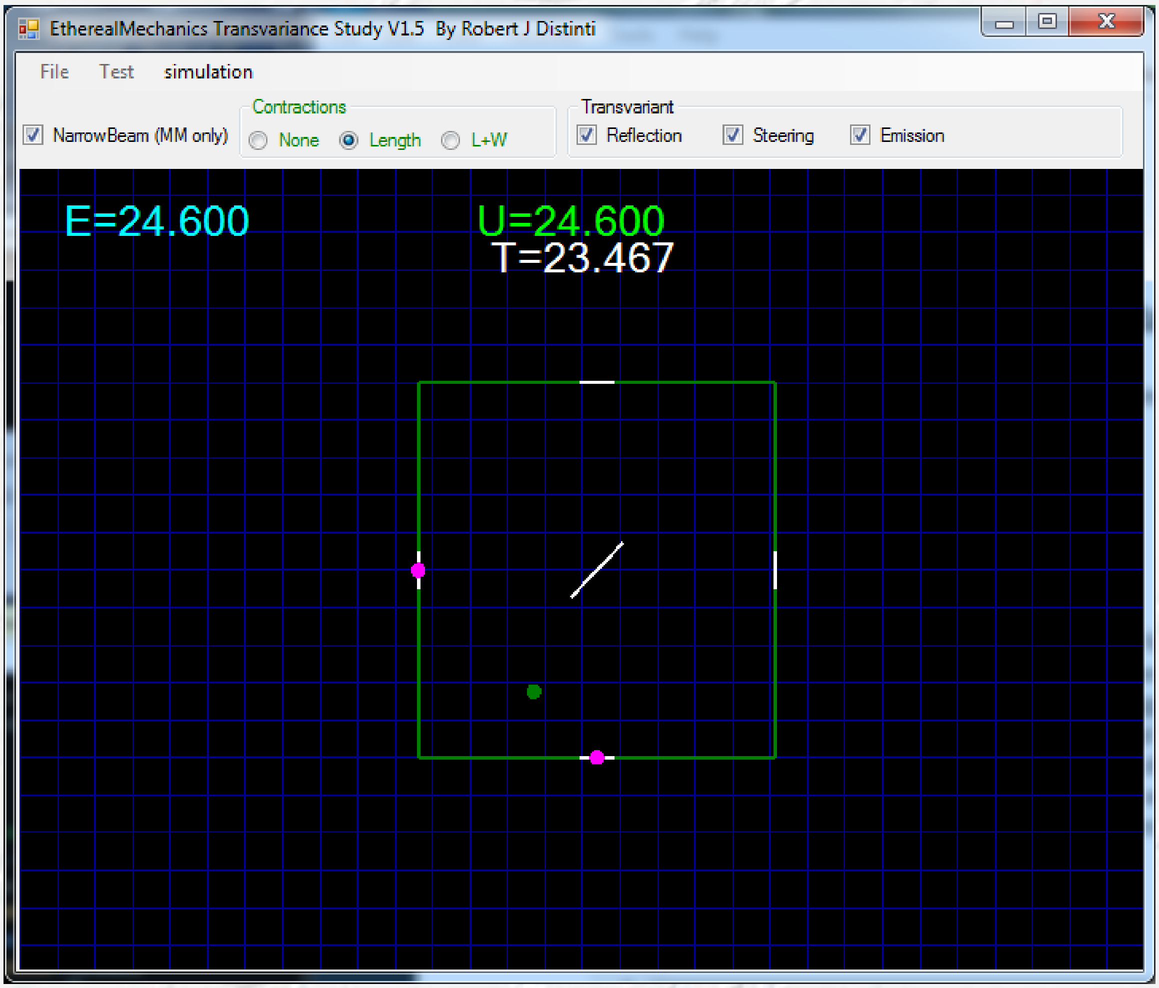
Ethereal Mechanics resolves the paradox by stating that Transvariant effects are always relative to the velocity of the subject to the etheric medium. This resolves the ambiguity while at the same time making it theoretically possible to develop a star ship that drags the medium with it, sparing passengers from Transvariant effects such as time dilation or length contraction. Such a ship should have no theoretical upper limit on speed; however, practical limits resulting from space debris or unforeseen side effects would have to be considered.

Furthermore, Relativity is looked upon as a correction to basic mechanics (Newtonian Mechanics) and yet does not explain how Length contraction or Time Dilation are manifested. Ethereal Mechanics demonstrates these effects as simple applications of basic mechanics. The concepts of Transvariances are found in other branches of mechanics. For example the departure angle of the bow wake of a ship will change based on the velocity of the ship through the medium (water).

Ethereal Mechanics: Transvariance Supersedes Special Relativity. The next paper in the series is Ethereal Mechanics: Gravity which Supersedes General Relativity and explains Gravity, Stellar Aberration, Precession of Orbits as well as Black Holes and the formation of Galaxies.

Appendix A. Reconciliation of Time

The MME experiments run in the body of the text experienced different observer times depending on situation. The problem was that the start trigger for the clock is on the emitter and the stop trigger for the clock is on the detector. The start and stop triggers are on different sides of the MME and the triggers register instantaneously in the simulation which is physically unrealistic. A real timer would have to send a signal which could only travel at the speed of light. To resolve this problem, the detector plate is arranged such that it sends a green photon back to the start plate to act as the trigger that stops the timer. The timer is started when the initial photon exits the emitter on the start plate. Because the start and stop signals originate at the same location on the experiment, the time divergence is resolved.



These revised experiments are accessed from the following menus of the simulation software

Simulation→Michelson-Morley→Stationary Closed
Simulation→Michelson-Morley→In Motion Launch in X Closed

Appendix B. References

[https://www.youtube.com/watch?v=_LWXeFIT-4g] Transvariance Simulation Video

[https://www.patreon.com/posts/22830195] Transvariance Simulation Executable (Win7 and above)

[https://www.youtube.com/watch?v=vBgdiAij1gA] Derivation of Transvariant Steering

[https://www.youtube.com/watch?v=YssguP9OIAI] Derivation of Transvariant Emission