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Finding the Right Current

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ABSTRACT

Engineers can find the current for a DC circuit by using Ohm's law. But the circuit doesn't know about equations and can't calculate the value of current. But somehow the circuit finds the current needed to satisfy Kirchhoff's law. A mechanical model called TPM is used to show how current finds an equilibrium that indeed satisfies Kirchhoff's law.

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Introduction

The model used for this paper has been developed and used for the last nine years by the author and his son, the former being a retired electrical engineer and physicist. The Particle Model (TPM) describes the entire universe as moving bodies and was first described in the book "Principia Mathematica 2" [1] in 2021. TPM proposes that the electron, photon, graviton, and magneton (a particle that creates magnetic fields) are the same particle given that all these forces travel at the speed of light and do not have the arbitrary property of charge. This is also being described in a second book by the author and his son coming in 2024 called "The Four Universal Motions in Physics" [2].

The intent of TPM is to give physicality to all forces in the universe as moving mass including gravity, light, magnetism, and electricity simply by defining each of these by the way they move, not by any special properties. It is with this model that we will show how current finds equilibrium.

In this paper, we will refer to what some people call the electron as the G1 particle which has no charge is and also the same particle for light, magnetism, and gravity. G1 particles are simply electrons without charge.

A Stable DC Circuit

Most engineers would say that a DC circuit is stable when the sum of all voltages around the circuit equals zero. But the circuit can't find stability that way. Resistors don't know the value of their own voltage and certainly not the value of the other voltages.

Finding the Right Current

Current is calculated using Ohm's law. If the current around the circuit is constant, Kirchhoff's voltage law is valid. But the circuit knows nothing about Ohm's law or Kirchhoff's law. So, how does the circuit find the right amount of current?

TPM (The Particle Model) suggests that the circuit is stable when the number of G1s added by the battery equals the loss of G1s in the resistors. A G1 is lost when it leaves the circuit due to a collision with a component of the circuit.
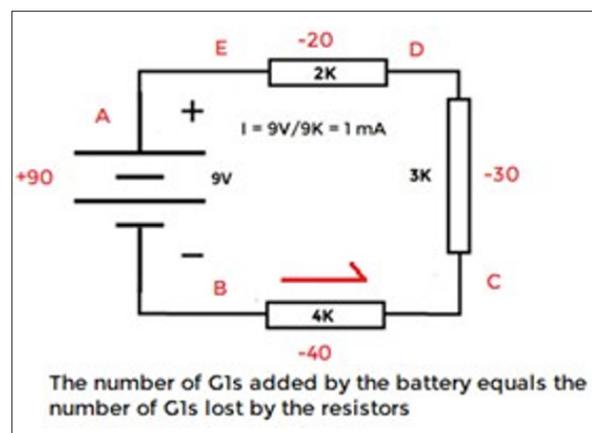

Figure 1: Summing the Voltages

The idea that a particle can be lost as it passes through a component is a new concept. This is not taught in any electrical course. Normally, electrons always stay within the circuit and the wiring. But the G1 particle can hit another G1 and can move away. It is a simple mechanical process with no charge. If you are concerned about whether this is possible, consider Einstein's paper on the Photo Electric effect.
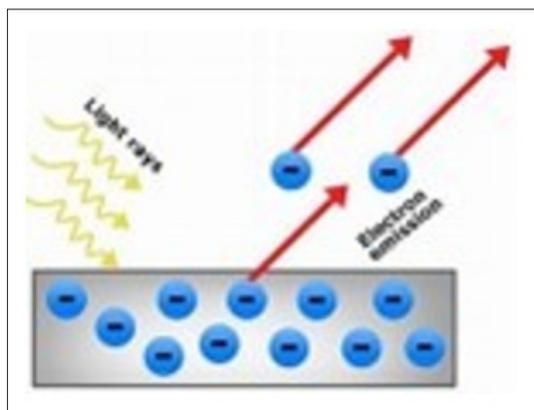
Figure 2: The Photo Electric Effect

We were taught that batteries emit electrons. However, we were never told that electrons are lost as they pass through a resistor. But the photo electric effect makes it possible. When a G1 is hit by another G1, it could scatter.
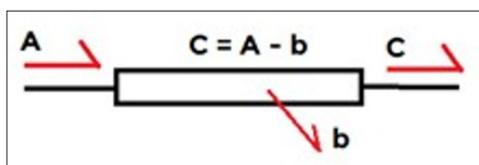

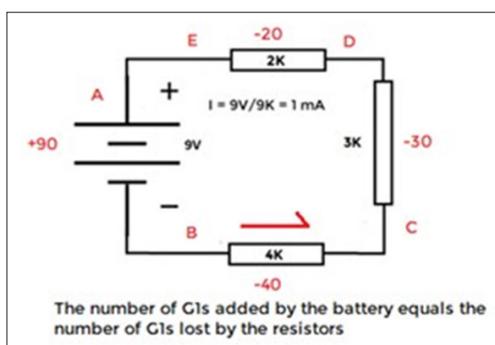**Figure 3:** The G1 hits the resistor and scatters. The sum of G1s added equals the sum of G1s lost

Figure 4: – Sum of G1s is zero

Spreadsheet Analysis

The spreadsheet analysis is based on two parameters. The volts per G1 (VG1) and the resistor interaction factor (IFR). As of this date, these values are not known. So, the values must be assumed to generate an example.

If VG1 = 0.1 Volts/G1, then a 9Volt battery adds 90 G1s. If IFR is 0.0001, then the number lost is equal to the number into the resistor times IFR times R. To keep the chart to a reasonable size only the A value is shown.

TPM Equations for Figure 5 and Figure 6.
These equations were used to generate the charts.

$$B = A + Vb/VG1 \qquad (1)$$
$$C = B * (1 - IFR * 4K), \qquad (2)$$
$$D = C * (1 - IFR * 3K), \qquad (3)$$
$$E = D * (1 - IFR * 2K), \qquad (4)$$
$$A = LastE \qquad (5)$$

The IFR term indicates the amount of loss in each resistor. The A value for cycle 1 is the E value for cycle 0.

The first chart sets the A value to 0 at cycle 0. The second chart sets the A value to 100 at cycle 0. After 20 cycles in each chart, the final value for both is 40.8139535. No matter how many G1s are there at the beginning, the final number is the same. This number is based on the two assumed values of VG1 and IFR and therefore these values are not real. These charts only explain the process that the circuit would go through to find the end value.

Conclusion

Without physical models for electricity, atoms, photons, and more, we in electrical engineering are shackled to empirical equations that will not be able to explain the behaviors of electricity, even our simplest circuits.

The Particle Model and The Four Universal Motions in physics give physicality to the entire universe including electricity, atoms, and electronic circuits and when applied by electrical engineers like myself, can explain how current can find the right value in a DC circuit.

Ifr	Cycles	R1	R2	R3	A	Vb	VG1
0.0001	0	2000	3000	4000	0	9	0.1
0.0001	1	2000	3000	4000	34.56	9	0.1
0.0001	2	2000	3000	4000	47.8310400	9	0.1
0.0001	3	2000	3000	4000	52.9271194	9	0.1
0.0001	4	2000	3000	4000	54.8840138	9	0.1
0.0001	5	2000	3000	4000	55.6354613	9	0.1
0.0001	6	2000	3000	4000	55.9240171	9	0.1
0.0001	7	2000	3000	4000	56.0348226	9	0.1
0.0001	8	2000	3000	4000	56.0773719	9	0.1
0.0001	9	2000	3000	4000	56.0937108	9	0.1
0.0001	10	2000	3000	4000	56.0999849	9	0.1
0.0001	11	2000	3000	4000	56.1023942	9	0.1
0.0001	12	2000	3000	4000	56.1033194	9	0.1
0.0001	13	2000	3000	4000	56.1036746	9	0.1
0.0001	14	2000	3000	4000	56.1038111	9	0.1
0.0001	15	2000	3000	4000	56.1038634	9	0.1
0.0001	16	2000	3000	4000	56.1038836	9	0.1
0.0001	17	2000	3000	4000	56.1038913	9	0.1
0.0001	18	2000	3000	4000	56.1038943	9	0.1
0.0001	19	2000	3000	4000	56.1038954	9	0.1
0.0001	20	2000	3000	4000	56.1038958	9	0.1

Figure 5: Table 1

Ifr	Cycles	R1	R2	R3	A	Vb	VG1
0.0001	0	2000	3000	4000	100	9	0.1
0.0001	1	2000	3000	4000	72.9600000	9	0.1
0.0001	2	2000	3000	4000	62.5766400	9	0.1
0.0001	3	2000	3000	4000	58.5894298	9	0.1
0.0001	4	2000	3000	4000	57.0583410	9	0.1
0.0001	5	2000	3000	4000	56.4704030	9	0.1
0.0001	6	2000	3000	4000	56.2446347	9	0.1
0.0001	7	2000	3000	4000	56.1579397	9	0.1
0.0001	8	2000	3000	4000	56.1246489	9	0.1
0.0001	9	2000	3000	4000	56.1118652	9	0.1
0.0001	10	2000	3000	4000	56.1069562	9	0.1
0.0001	11	2000	3000	4000	56.1050712	9	0.1
0.0001	12	2000	3000	4000	56.1043473	9	0.1
0.0001	13	2000	3000	4000	56.1040694	9	0.1
0.0001	14	2000	3000	4000	56.1039626	9	0.1
0.0001	15	2000	3000	4000	56.1039217	9	0.1
0.0001	16	2000	3000	4000	56.1039059	9	0.1
0.0001	17	2000	3000	4000	56.1038999	9	0.1
0.0001	18	2000	3000	4000	56.1038976	9	0.1
0.0001	19	2000	3000	4000	56.1038967	9	0.1
0.0001	20	2000	3000	4000	56.1038963	9	0.1

Figure 6: Table 2

References

1. de Hilster R, de Hilster D (2021) Principia Mathematica 2: A Complete Toolkit for Hacking the Physical Universe. ISBN 979-8759215547.
2. de Hilster R, de Hilster D (2024) The Four Universal Motions in Physics. Unpublished book coming.