WORDS IN BOXES ALL CAPITAL LETTERS.

CAPITAL

21A

THE TELEGRAPH EQUATION, PART ONE

FROM THE PREVIOUS SECTIONS IT HAS BEEN ESTABLISHED A SET OF DIMENSIONAL RELATIONS AS DERIVED FROM FOUR BASIC ELECTRICAL LAWS,

(1) THE LAW OF DIELECTRIC PROPORTION

(a) FARAD, OR COULOMB PER ~~SECOND~~ VOLT

(b) COULOMB, OR VOLT - FARAD

(2) THE LAW OF MAGNETIC PROPORTION

(a) HENRY, OR WEBER PER AMPERE

(b) WEBER, OR AMPERE - HENRY

(3) THE LAW OF MAGNETIC INDUCTION

SPACE ↑ (a) VOLT, OR WEBER PER SECOND
× (b) WEBER, OR VOLT-SECOND
SPACE ↓

(4) THE LAW OF DIELECTRIC INDUCTION

SPACE ↑ (a) AMPERE, OR COULOMB PER SECOND
× (b) COULOMB, OR AMPERE-SECOND
SPACE ↕
SPACE ↓

RECOMBINATION OF THESE DIMENSIONAL RELATIONS, OR ELECTRICAL LAWS, THEN EXPRESSES A PAIR OF RATIOS, OF PRIMARY DIMENSIONS IN VARIATION WITH RESPECT TO TIME. HENCE, FOR THE DIELECTRIC FIELD,

(5) FARAD PER SECOND, OR SIEMENS.

AND FOR THE MAGNETIC FIELD,

(6) HENRY PER SECOND,
OR OHM

FROM THIS PAIR OF DIMENSIONAL RELATIONS ARE DERIVED A SERIES OF ENERGY TRANSFER AND STORAGE CO-EFFICIENTS. GROUPING THESE INTO A PAIR OF CATEGORIES, THESE ARE GIVEN AS;

(I) ENERGY STORAGE AND DISSIPATION

(a) DIELECTRIC ENERGY STORAGE,
SUCEPTANCE, B, IN FARAD PER SEC

(b) MAGNETIC ENERGY STORAGE,
REACTANCE, X, IN HENRY PER SEC

AND

(c) Dielectric Energy Dissipation, Conductance, G, in Siemens

(d) Magnetic Energy Dissipation, Resistance, R, in Ohm

(II) The Energy Consumption or Production

(a) Dielectric Energy Consumption, Conductance, G, in Farad per sec, or Siemens

(b) Magnetic Energy Consumption, Resistance, R, in Henry per sec, or Ohm

AND

(c.) Dielectric Energy Production, Acceptance, S, in Farad per Sec., or Siemens

(d) Magnetic Energy Production, Receptance, H, in Henry per Sec., or Ohm.

It should be noted that these various groupings of coefficients exist in distinct, independent, time frames. The dissipation coefficients are the result of random molecular variations, that is, Noise. The consumption coefficients are harmonic in nature, relating to the operating frequencies, likewise for the production coefficients. The random and the harmonic time functions are NOT ADDITIVE. In

GENERAL, THE COMBINATIONS OF THESE COEFFICIENTS APPEAR AS VERSOR SUMS. MORE ON THIS LATER.

SINCE THE TOTAL ELECTRIC INDUCTION IS THE PRODUCT OF THE TOTAL DIELECTRIC INDUCTION AND THE TOTAL MAGNETIC INDUCTION, THERE EXISTS THE PRODUCTS OF THE COEFFICIENTS OF DIELECTRIC INDUCTION AND THE COEFFICIENTS OF MAGNETIC INDUCTION. THESE PRODUCTS GIVE RISE TO A SET OF ELECTRICAL FACTORS. THESE FACTORS, THE PRODUCT OF THE DIELECTRIC PART, IN SIEMENS, AND OF THE MAGNETIC PART, IN OHM, GIVES RISE TO THE DIMENSIONAL RELATION

(7) OHM-SIEMENS, OR
NUMERIC

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HENCE, THIS DERIVED DIMENSIONAL RELATION, OR FACTOR, IS A NUMERIC, THAT IS, DIMENSIONLESS. SINCE BOTH THE OHM AND THE SIEMENS ARE VERSOR QUANTITIES, IT FOLLOWS THAT THIS NUMERIC IS ALSO A VERSOR, A DIMENSIONLESS VERSOR MAGNITUDE. IT IS NOT A SCALAR, IT IS A VERSOR. WITH A POSITION IN TIME.

THESE FACTORS ARE HEREBY ESTABLISHED TO BE DIMENSIONLESS VERSOR MAGNITUDES. COMBINING THE DIELECTRIC AND MAGNETIC COEFFICIENTS GIVES THE FOLLOWING FACTORS,

(a) THE ENERGY STORAGE FACTOR, XB, IN OHM-SIEMENS, OR HENRY-FARAD PER SECOND SQUARED

(b) THE ENERGY LOSS FACTOR, RG, IN OHM-SIEMENS

(c) THE ENERGY GAIN FACTOR, HS, IN OHM-SIEMENS, OR HENRY-FARAD PER SEC SQUARED.

HEREBY IT IS, HS SUPPLIES THE ENERGY, XB HOLDS THE ENERGY, RG REMOVES THE ENERGY. THESE THREE FACTORS DEFINE THE MOVEMENT OF ELECTRICITY THRU THE DIMENSION OF TIME, THIS FOR A GENERALIZED ELECTRICAL CONFIGURATION.

IT IS USUALLY THAT THE ELECTRICAL CONFIGURATION, THE METALLIC-DIELECTRIC GEOMETRY, EXHIBITS ONLY ENERGY LOSSES, NO COMPONENT OF ENERGY GAIN EXISTS. AN EXAMPLE IS ONE SPAN OF A J-CARRIER OPEN WIRE TRANSMISSION LINE. THIS LINE

HOLDS ENERGY IN ITS BOUND ELECTRIC FIELD OF INDUCTION, BUT A PORTION OF THIS ENERGY IS LOST THRU MOLECULAR ACTION WITHIN THE GLASS INSULATORS AND WITHIN THE COPPERWELD WIRES. THERE EXISTS NO COMPONENT OF ENERGY GAIN IN THIS SPAN OF OPEN WIRE LINE. HERE IT IS THE PARAMETRIC TERMS VANISH. NO FACTOR HS EXISTS AND RG IS PURE DISSIPATION. THESE SIMPLIFICATIONS ALLOW FOR THE ALGEBRAIC EXPRESSION IN AN ARCH-ETYPICAL FORM OF THE GENERALIZED ELECTRICAL CONFIGURATION.

GIVEN THE BASIC DIMENSIONAL RELATIONS,

X, THE REACTANCE, IN HENRY PER SEC

AND

B, THE SUCEPTANCE, IN FARAD PER SEC

THESE RELATIONS REPRESENTING ENERGY EXCHANGE BETWEEN THE DIELECTRIC FIELD, AND THE MAGNETIC FIELD, OF INDUCTIONS. THIS ENERGY EXCHANGE IS IN AN ALTERNATING FORM. IT IS ALSO

R, THE RESISTANCE, IN OHM

AND

G, THE CONDUCTANCE, IN SIEMENS

THESE RELATIONS REPRESENTING ENERGY REMOVAL FROM THE MAGNETIC FIELD, AND THE DIELECTRIC FIELD, OF INDUCTIONS. THIS ENERGY LOSS IS IN A CONTINUOUS FORM. HEREBY XB IS THE ALTERNATING "CURRENT" FACTOR, AND RG IS THE DIRECT, OR CONTINUOUS, "CURRENT" FACTOR.

OBVIOUSLY, IN THE SITUATION OF AN ELECTRIC GENERATOR, HS COULD REPLACE

RG IN SUCH A CONFIGURATION. HERE ENERGY IS PRODUCED IN A MANNER OF NEGLIGEBLE LOSSES, AND THUS RG DROPS OUT OF THE EQUATION. IT IS HOWEVER, A SYSTEM OR CONFIGURATION EXHIBITING BOTH LOSS AND GAIN REQUIRES A MORE COMPLEX ALGEBRAIC EXPRESSION. THIS IS DEVELOPED IN THE FINAL SECTION OF "SYMBOLIC REPRESENTATION OF THE GENERALIZED ELECTRIC WAVE" BY E.P. DOLLARD.

COMBINING TERMS WITH LIKE DIMENSIONAL RELATIONS, THAT IS, OHM AND HENRY PER SECOND, OR SIEMENS AND FARAD PER SECOND, GIVES RISE TO A TOTAL IMPEDANCE, OR A TOTAL ADMITTANCE OF THE ELECTRICAL CONFIGURATION. HENCE IT IS,

(I) The total admittance, Y, in Siemens

(8) $Y = G - jB$

The versor sum of the Conductance, G, in siemens, and the Sucptance, B, in Farad per Second.

(II) The total Impedance, Z, in Ohm

(9) $Z = R + jX$

The Versor sum of the resistance, R, in Ohm, and the Reactance, X, in Henrt per Second.

Here Y represents the dielectric field, and Z represents the magnetic field.

THE ELECTRK FIELD IS THE PRODUCT OF THE DIELECTRIC FIELD, AND THE MAGNETIC FIELD. Φ IS PSI TIMES PHI. TAKING THEN THE PRODUCT OF THE TOTAL DIELECTRIC ADMITTANCE, Y, IN SIEMENS, AND THE TOTAL MAGNETIC IMPEDANCE, Z, IN OHM, GIVES THE DIMENSIONAL RELATION

(10) SIEMENS - OHM
OR NUMERIC

HENCE ZY IS A DIMENSIONLESS MAGNITUDE, IT HAVING A VERSOR POSITION IN TIME, SINCE BOTH Z AND Y HAVE A VERSOR POSTION IN TIME. THE PRODUCT OF TWO VERSORS IS ALSO A VERSOR. ZY IS NOT SCALAR, IT IS A DIMENSIONLESS VERSOR MAGNITUDE. IT REPRESENTS A WAVE PROPAGATION IN THE DIMENSION OF TIME, A TIME WAVE. BK DE NGKPH.