Why Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them

Eugene Adiutori

Abstract

There are three reasons why laws such as q = hΔ?"T and ? = E?, and parameters such as h and E, should be abandoned. 1. The laws are analogs of y = (y/x)x and, if y is a nonlinear function of x, analogs of (y/x) (such as h and E) are extraneous variables that greatly complicate problem solutions. 2. Parameters such as h and E were created by assigning dimensions to numbers, in violation of the modern view that dimensions must not be assigned to numbers. 3. The laws purport to describe how the numerical value and dimension of parameters are related when, in fact, equations can rationally describe only how the numerical values of parameters are related.When conventional engineering laws are abandoned, they will be replaced by new laws described by the following: 1. They are dimensionless because parameter symbols in equations represent only numerical value. 2. They are analogs of y = fx. 3. They contain no analogs of y/x, and consequently they contain no extraneous variables. 4. They make it possible to abandon analogs of y/x (such as modulus and heat transfer coefficient), greatly simplifying the solution of nonlinear problems by reducing the number of variables. 5. They have no parameters that were created by assigning dimensions to numbers. 6. They are inherently dimensionally homogeneous because parameter symbols in equations represent only numerical value. 7. They state that the numerical value of parameter y is always a function of the numerical value of parameter x, and the function may be proportional, linear, or nonlinear.

Index terms—

1 Eugene F. Adiutori

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When conventional engineering laws are abandoned, they will be replaced by new laws described by the following: 1.

They are dimensionless because parameter symbols in equations represent only numerical value. 2. They are analogs of y = f{x}. 3. They contain no analogs of y/x, and consequently they contain no extraneous variables. 4. They make it possible to abandon analogs of y/x (such as modulus and heat transfer coefficient), greatly simplifying the solution of nonlinear problems by reducing the number of variables. 5. They have no parameters that were created by assigning dimensions to numbers. 6. They are inherently dimensionally homogeneous because parameter symbols in equations represent only numerical value. 7. They state that the numerical value of parameter y is always a function of the numerical value of parameter x, and the function may be proportional, linear, or nonlinear. onventional engineering laws work well when applied to phenomena that exhibit proportional

44 behavior because laws such as Eqs. (1) and (2) are proportional equations, and proportional equations accurately
45 describe proportional behavior. q = hÎ?"T (1)? = E?**(2)**
46 Conventional engineering laws do not work well when applied to phenomena that exhibit nonlinear behavior
47 because laws such as Eqs. (1) and (2) are proportional equations, and proportional equations cannot describe
48 nonlinear behavior. For example, if q is a nonlinear function of Î?"T (as in natural convection, condensation,
49 and boiling), Eq. (1) does not state that q is a nonlinear function of Î?"T. It states only that h is a symbol for
50 q/Î?"T-ie states only that h and q/Î?"T are identical and interchangeable.

2 II.

3 Parameter Symbolism in Conventional Engineering

53 Since the beginning of science, scientists and engineers have agreed that parameter symbols in equations represent
54 numerical values and dimensions. Therefore the meaning of equations such as Eqs. (1) and (2) should be described
55 in the following rigorously correct manner:
56 The numerical value and dimension of q equal the numerical value and dimension of h times the numerical
57 value and dimension of Î?"T.
58 The numerical value and dimension of ? equal the numerical value and dimension of E times the numerical
59 value of ?.
60 In the rest of this article, the meaning of conventional engineering equations is oftentimes described in the
61 above rigorously correct manner in order to illustrate that Hooke and Newton were correct-dimensions cannot
62 rationally be multiplied or divided.

4 III.

5 The First Conventional Engineering Law

65 Equation (1) was the first conventional engineering law. q = hÎ?"T (1)
66 . However, the meaning of Eq. (1) has changed considerably since 1822. Until sometime near the beginning
67 of the twentieth century, Eq. (1) meant:
68 ? It is always a proportional equation. It states that the numerical value and dimension of q are always
69 proportional to the numerical value and dimension of Î?"T, and the numerical value and dimension of h are
70 always the proportionality constant. ? h is always a symbol for q/Î?"T-ie h and q/Î?"T are always identical and
71 interchangeable. Since sometime near the beginning of the twentieth century, Eq. (1) has meant:
72 ? It applies to all forms of convection heat transfer.
73 ? It states that the numerical value and dimension of q always equals the numerical value and dimension of h
74 times the numerical value and dimension of Î?"T. ? It may or may not be a proportional equation.
75 ? The relationship between q and Î?"T may be proportional, linear, or nonlinear.
76 ? h may be a constant or a variable dependent on Î?"T.
77 ? If q is not proportional to Î?"T (as in natural convection, condensation, and boiling), Eq. (1) reveals only
78 that h is always a symbol for q/Î?"T-ie reveals only that h and q/Î?"T are always identical and interchangeable.
79 Until the nineteenth century, scientists and engineers agreed that equations cannot describe how parameters
80 are related because parameter symbols in equations represent numerical value and dimensions, and it was globally
81 agreed that dimensions cannot rationally be multiplied or divided. That is why Hooke's law is a proportion rather
82 than an equation. It is also why Newton's second law of motion published in Newton [3] is not force equals mass
83 times acceleration. It is acceleration is proportional to force.

6 V.

85 How Fourier made it Possible to Create Equations that Quantitatively Describe how Parameters are Related
86 Early in the nineteenth century, Fourier conceived the revolutionary views that parameters in equations can
87 be multiplied and divided, and dimensions can rationally be assigned to numbers. This made it possible, for
88 the very first time, to create equations that quantitatively describe how parameters are related. Fourier's entire
89 nearly 500 page treatise The Analytical Theory of Heat [1] is predicated on:
90 ? His revolutionary view that dimensions can rationally be multiplied and divided.
91 ? His revolutionary view that dimensions can rationally be assigned to numbers.
92 ? The prevailing view that parameter symbols in equations represent numerical value and dimension.
93 ? The prevailing view that parametric equations must be dimensionally homogeneous.
94 Fourier made no effort to prove the validity of his revolutionary views. In his entire treatise, Fourier's **??**1b]
95 only defense of his revolutionary views is the following paragraph:
96 . . . every undetermined magnitude or constant has one dimension proper to itself, and the terms of one
97 and the same equation could not be compared if they had not the same exponent of dimensions. . . (This
98 view of homogeneity) is the equivalent of the fundamental lemmas (axioms) which the Greeks have left us
99 without proof. 1 Adiutori [2] states that Fourier made so many contributions to modern engineering science
100 that he should be considered the father of modern engineering. For example, Fourier should be credited with

the concepts of flux, heat transfer coefficient, thermal conductivity, dimensional homogeneity, the solution of boundary condition problems, the sciences of convective and conductive heat transfer, and the methodology required to create dimensionally homogeneous laws.

7 Global

8 Nineteenth Century

Fourier's treatise does not include the axioms the Greeks left us without proof, it does not specify which axioms Fourier referred to, and it does not cite a reference where the pertinent axioms could be found. Presumably Fourier's colleagues accepted his unproven views because, using his revolutionary views, he was able to solve heat transfer problems that had never been solved. His revolutionary and unproven views are fundamental and important views in modern engineering science.

Why Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them VI.

9 How Fourier Created the First Conventional Engineering Law

Fourier performed experiments in convection heat transfer. His purpose was to determine a dimensionally homogeneous equation/law that describes how the numerical value and dimension of convective heat flux are related to the numerical value and dimension of the boundary layer temperature difference.

From his data, Fourier concluded that, if heat transfer is by the steady-state forced convection of ambient air flowing over a solid, warm body, the relationship between the numerical value and dimension of q and the numerical value and dimension of Î?"T is always proportional, and is described by Eq. (3) in which c is the numerical value of the proportionality constant.$q = c\hat{I}?"T$ **(3)**

Fourier was not satisfied with Eq. (3) because it is not homogeneous. Fourier recognized that Eq. (3) could be transformed to a homogeneous equation only if it were rational to assign dimensions to numbers, and rational to multiply and divide dimensions. Consequently, Fourier conceived the revolutionary view that dimensions can rationally be assigned to numbers, and dimensions can rationally be multiplied and divided. To number c in Eq. (3), Fourier assigned the symbol h, the dimensions of $(q/\hat{I}?"T)$, and the name coefficient, resulting in Eq. (**??**), the dimensionally homogeneous law of forced convection heat transfer to ambient air flowing in steady-state over a solid, warm body. 2 $q = h\hat{I}?"T$ (4)

In Fourier's view, Equation (**??**) states that, if heat transfer is by the steady-state forced convection of ambient air flowing over a solid, warm body, the numerical value and dimension of q are always proportional to the numerical value and dimension of Î?"T, and the numerical value and dimension of h are always the constant of proportionality. Fourier **??**1c] defined h in the following:

We have taken as the measure of the external conducibility of a solid body a coefficient h, which denotes the quantity of heat which would pass, in a definite time (a minute), from the surface of this body, into atmospheric air, supposing that the surface had a definite extent (a square metre), that the constant temperature of the body was 1, and that of the air 0, and that the heated surface was exposed to a current of air of a given invariable velocity.

In natural convection heat transfer, heat flux and temperature difference are often determined by first determining the heat transfer coefficient from a chart of Nusselt number vs Rayleigh number. If the chart is used to determine heat transfer coefficient given temperature difference, the chart can be read in a direct manner because Rayleigh number is independent of heat flux. But if the chart is used to determine heat transfer coefficient given heat flux, it cannot be read in a direct manner because temperature difference is implicit on both axes (since the Nusselt number hD/k (ie $qD/\hat{I}?"Tk$) is inversely proportional to Î?"T, and the Rayleigh number is directly proportional to Î?"T). Therefore the chart must be read in an indirect manner.

However, h can be eliminated from the chart by plotting the product of Nusselt number and Rayleigh number vs Rayleigh number. This eliminates h because it eliminates the Î?"T in the denominator of Nusselt number, leaving qD/k in place of $qD/\hat{I}?"Tk$.

After h has been eliminated from the chart, the chart of Nusselt number times Rayleigh number vs Rayleigh number can be read directly to determine heat flux given temperature difference, or temperature difference given heat flux.

10 Q.E.D. h is unnecessary and undesirable.

11 VIII. Proof That Fluid Friction Factor f Is Unnecessary and Undesirable

In conventional engineering, if fluid flow is laminar, the relationship between fluid flow and pressure drop is described by a simple equation. But if fluid flow is turbulent, the relationship between flow rate and pressure drop is nonlinear, and flow rate or pressure drop is usually determined by first determining the fluid friction factor f from the Moody chart, a chart of f vs Reynolds number. If the flow rate is given and f is to be determined, the Moody chart can be read in a direct manner because the Reynolds number is independent of pressure drop.

But if the pressure drop is given and f is to be determined, the Moody chart cannot be read in a direct manner because fluid flow rate is implicit on both axes. Therefore the chart must be read in an indirect manner.

Why Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them VII. Proof That h Is Unnecessary and Undesirable However, since f is inversely proportional to flow rate squared, and Reynolds number is directly proportional to flow rate, f can be eliminated from the chart by plotting the product of f and Reynolds number squared vs Reynolds number. This eliminates f from the chart because it eliminates flow rate in the f denominator.

After f has been eliminated from the chart, the chart can be read directly to determine flow rate given pressure drop, or pressure drop given flow rate.

12 Q.E.D. f is unnecessary and undesirable.

Multiplication is repeated addition. Six times eight means add eight six times. Therefore things that cannot be added cannot be multiplied.

It is generally agreed that dimensions cannot rationally be added. Therefore dimensions cannot rationally be multiplied because they cannot rationally be added, and multiplication is repeated addition.

Since six times eight means add eight six times, "kilograms times meters" must mean add meters kilograms times. Because "add meters kilograms times" has no meaning, dimensions cannot rationally be multiplied.

Since twelve divided by four means how many fours are in twelve, "meters divided by seconds" must mean how many seconds are in meters. Because "how many seconds are in meters" has no meaning, dimensions cannot rationally be divided.

13 Q.E.D. Dimensions cannot rationally be multiplied or divided.

In conventional engineering, Eq. (5) is the law of convection heat transfer.$q = h\hat{I}?"T$ **(5)**

Rearranging Eq. (5) results in Eq. (6). $h = (q/\hat{I}?"T)$

Combining Eqs. (5) and (6) results in Eq. (7). $q = (q/\hat{I}?"T)\hat{I}?"T$ (7) Equations (5), (6), and (7) are identical. All three equations are analogs of Eq. (8), and h and $q/\hat{I}?"T$ are analogs of (y/x). $y = (y/x)x$ (8) Equation (**??**) is anathema in mathematics and engineering because, if parameter y is a nonlinear function of parameter x, parameter (y/x) is an extraneous variable, and it complicates problem solutions.

Consequently all laws that are analogs of Eq. (**??**), and all parameters that are analogs of (y/x), should be abandoned because, if parameter y is a nonlinear function of parameter x, parameter (y/x) is an extraneous variable, and it complicates problem solutions.

Fourier **??**1b] is generally credited with the modern view of dimensional homogeneity. However, the modern view of dimensional homogeneity differs from Fourier's view in one important way. In the modern view, it is irrational to assign dimensions to numbers. In 1951, Langhaar [6] stated:

Dimensions must not be assigned to numbers, for then any equation could be regarded as dimensionally homogeneous.

Laws such as Eqs. (**??**) and (10) are irrational because parameters such as h and E were created by assigning dimensions to numbers, in violation of the modern view that "Dimensions must not be assigned to numbers, for then any equation could be regarded as dimensionally homogeneous." Why Laws Such As $q = h\hat{I}?"T$ and $? = E?$ Are Anathema In Mathematics and Engineering XI.

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How the Modern View of Dimensional Homogeneity Differs from Fourier's View

Why Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them XII. Why Laws Such As Eqs. (**??**) and (10) Violate the Modern View of Dimensional Homogeneity, and Consequently Are Irrational$q = h\hat{I}?"T$ (9) $? = E?$ (10)

Consequently all laws that are analogs of Eq. (**??**), and all parameters that are analogs of (y/x) in Eq. (**??**), should be abandoned because they were created by assigning dimensions to numbers, in violation of the modern view that dimensions must not be assigned to numbers.

However, laws that are analogs of Eq. (**??**), and parameters that are analogs of (y/x) in Eq. (8), have not yet been abandoned in spite of the fact that they have, for almost a century, violated the prevailing view that dimensions must not be assigned to numbers.

15 XIII. Why Engineering Parameters Cannot be Proportional

It is axiomatic that pigs cannot be proportional to airplanes because pigs and airplanes are different things, and different things cannot be proportional. Therefore it is axiomatic that parameter y cannot be proportional to parameter x because parameter y and parameter x are different things, and different things cannot be proportional. However, the numerical value of parameter y can be proportional to the numerical value of parameter x because different numerical values are not different things.

XIV.

16 Hooke's Error

In 1676, Hooke [7] concluded from his data that, in the elastic region, stress is proportional to strain. Hooke was wrong. Stress cannot be proportional to strain because stress and strain are different things, and different things cannot be proportional. Hooke should have concluded the following: In the elastic region, the numerical value of stress is proportional to the numerical value of strain.

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18 XV. why equations cannot describe How engineering parameters Are Related

It is axiomatic that equations cannot describe how pigs and airplanes are related because pigs and airplanes are different things, and different things cannot be related. Therefore it is axiomatic that equations cannot describe how parameter y is related to parameter x because parameters y and x are different things, and different things cannot be related. However, equations can describe how the numerical value of parameter y is related to the numerical value of parameter x because different numerical values are not different things.

19 XVI. Fourier's Error, and the Heat Transfer Law He Should Have Conceived

From his data, Fourier [1a] concluded that, in steady-state forced convection heat transfer from a warm, solid body to ambient air, heat flux is always proportional to temperature difference.

Fourier was wrong. Heat flux cannot be proportional to temperature difference because they are different things, and different things cannot be proportional. Fourier should have concluded that:

? The numerical value of heat flux is proportional to the numerical value of temperature difference.

? Parameter symbols in equations represent only numerical value. Therefore rational parametric equations are inherently dimensionally homogeneous because they are dimensionless. ? If an equation is quantitative, the dimension units that underlie parameter symbols must be specified in an accompanying nomenclature. ? Equation (11), Fourier's law of steady-state forced convection heat transfer to ambient air, is irrational. Equations cannot rationally describe how heat flux and temperature difference are related because they are different things, and different things cannot be related. q = h?T (11)

? Equation (12) is the law Fourier should have conceived. It should have meant that the numerical value of q is always proportional to the numerical value of Î?"T, and the numerical value of c is the constant of proportionality.q = c ?T**(12)**

Fourier rejected Eq. (12) because parameter symbols represented numerical value and dimension, and therefore Eq. (12) was not dimensionally homogeneous.

20 XVII.

21 Ohm's Error

From his data, Ohm [8] concluded that electromotive force is proportional to electric current. He was wrong. Electromotive force cannot be proportional to electric current because they are different things, and different things cannot be proportional. Ohm should have concluded that the numerical value of electromotive force is proportional to the numerical value of electric current.

In modern conventional engineering, the dimensionally homogeneous Eq. (**??**3) is referred to as Ohm's law. It applies only if E is proportional to I.

22 E = IR (13)

If E is not proportional to I, charts of Eq. (14) are often used in spite of the fact that, in modern conventional engineering, Eq. (14) is not dimensionally homogeneous.I = f{E}**(14)**

XVIII.

23 The Purpose of Engineering Laws

The purpose of engineering laws is to identify the primary parameters, and to describe how the numerical values of the primary parameters are related. The relationship between the numerical values of primary parameters cannot generally be described in a specific way because most engineering phenomena exhibit more than one type of relationship.

For example, the relationship between the numerical value of convective heat flux and the numerical value of temperature difference may be proportional, linear, or nonlinear. The relationship between the numerical value of stress and the numerical value of strain may be proportional, linear, or nonlinear. The relationship between the numerical value of electromotive force and the numerical value of electric current may be proportional, linear, or nonlinear.

24 XIX.

A Mathematical Analog of the New Laws Assuming that symbols in equations represent numerical value but not dimension, Eq. (15) states that the numerical value of y is always a function of the numerical value of x, and the function may be proportional, linear, or nonlinear. y = f{x} (15) Equation (**??**5) is a mathematical analog of the new laws.

XX.

25 The New Laws of Engineering

The new law of convection heat transfer is Eq. (**??**6). Equation (16a) states that the numerical value of heat flux is always a function of the numerical value of temperature difference, and the function may be proportional, linear, or nonlinear. And similarly for Eq. (16b). In other words, Eq. (**??**6) applies to all forms of convection heat transfer. q = f{?T} (16a)Î?"T = f{q} (16b)

The new law of stress and strain is Eq. (**??**7). Equation (17a) states that the numerical value of stress is always a function of the numerical value of strain, and the function may be proportional, linear, or nonlinear. And similarly for Eq. (17b). In other words, Eq. (**??**7) applies in both the elastic and inelastic regions.? = f{?} (17a) ? = f{?} (17b)

The new law of resistive electrical behavior is Eq. (18). Equation (18a) states that the numerical value of electromotive force is always a function of the numerical value of electric current, and the function may be proportional, linear, or nonlinear. And similarly for Eq. (18b). In other words, Eq. (**??**8) applies to all conductors and semi-conductors. The new engineering laws, such as Eqs. (**??**6) to (18), will replace conventional laws because:

? Conventional laws are analogs of y = (y/x)x. Therefore if parameter y is a nonlinear function of parameter x, analogs of (y/x) (such as h and E) are extraneous variables that greatly complicate problem solutions. The new laws have no analogs of (y/x), and therefore they have no extraneous variables. ? Conventional laws and parameters such as h, E, and R were created by assigning dimensions to numbers, in violation of the modern view that dimensions must not be assigned to numbers. The new laws contain no parameters created by assigning dimensions to numbers. ? Parameters such as h, E, R, and f are unnecessary and undesirable. They are unnecessary because, as demonstrated in Sections 7 and 8, problems are readily solved without them. They are undesirable because, as demonstrated in Sections 7 and 8, when a conventional law is applied to nonlinear behavior, parameters such as h, E, R, and f are extraneous variables that complicate problem solutions. In the new laws, there are no parameters such as h, E, R, and f. ? If Eq. (**??**9) is used to solve a problem that concerns boiling heat transfer, the solution will include the three thermal variables q, q/?T, and ?T (q/Î?"T is a variable because the relationship between q and Î?"T is nonlinear). If Eq. (20) is used to solve the problem, the solution will include only the two thermal variables q and ?T. (And similarly for other branches of engineering.)q = hÎ?"T (19) q = f{Î?"T}**(20)**

? Conventional engineering laws are irrational because they purport to describe how parameters are related, in spite of the fact that equations cannot rationally describe how parameters are related. Equations can rationally describe only how the numerical values of parameters are related. The new laws describe only how the numerical values of parameters are related. ? The new laws make it much easier to learn engineering science because there are fewer parameters to learn about and to think about and to apply, and because the new laws make it possible to solve nonlinear problems with the variables separated, the preferred methodology in mathematics.

Texts based on conventional engineering laws can be transformed to texts based on the new laws by modifying the texts so that:

? Parameter symbols represent only numerical value.

? Laws are analogs of y = f{x}.

? Primary parameters are always separated.

? No parameter is created by assigning dimensions to numbers.

? No parameter is created by combining primary parameters.

? If an equation is quantitative, the dimension units that underlie parameter symbols are specified in the nomenclature.

A heat transfer text based on conventional engineering laws can be transformed to a text based on the new laws by modifying the text in the following ways: It is axiomatic that any problem that can be solved using the three thermal variables (q, q/?T, and ?T) can also be solved using the two thermal variables (q and ?T). It is also axiomatic that it is much more difficult to solve problems that concern three variables than problems that concern two variables.

? Because the numerical value of qconduction is generally proportional to the numerical value of dT/dx, Eq. (23) is generally the dimensionless law of conduction heat transfer. If there are materials that do not exhibit the proportional relationship indicated by Eq. (23), Eq. (24) replaces Eq. (23). qconduction = k (dT/dx) (= f{dT/dx} (24)

? In the nomenclature, state that parameter symbols represent only numerical value. Also state that if an equation is quantitative, the dimension units that underlie parameter symbols are specified in the nomenclature. ? In all equations and charts in which h is explicit or implicit (as in Nusselt number), replace h by q/Î?"T, then separate q and Î?"T. When Eq. (**??**2) is the law of convection heat transfer, all parameter groups that include

329 h are abandoned. ? In all equations and charts in which k/t is explicit or implicit, replace k/t by q/Î?"T, then
330 separate q and Î?"T.
331 ? Separating q and Î?"T in Eq. (**??**5) results in Eq. (26). Replace Eq. (25) with Eq. (26) U = 1/(1/h1 +
332 t/k + 1/h2) (25)Î?"Ttotal = Î?"T1{q} + Î?"Twall{q} + Î?"T2{q}**(26)**
333 XXIV.

26 Conclusions

335 The new laws will replace conventional laws because they result in a more rational and much simpler science of
336 engineering.

27 Symbols

338 Note: Depending on the context in which a parameter symbol is used, the symbol may represent numerical value
339 and dimension, or may represent only numerical value. c pure number E modulus ?/?, or electromotive force E
340 elastic elastic modulus, ?/? in the elastic region h heat transfer coefficient, q/?T I electric current q heat flux R
electrical resistance, E/I T temperature unidentified parameter unidentified parameter [1] [2] [3]

[Note: How q =]

Figure 1: ?

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[1] Although Newton is generally credited with both h and Eq. (4),Adiutori [4] andBejan [5] credit Fourier with both h and Eq. (4). Equation (4) is generally said to be "Newton's law of cooling", but Equation (4) cannot be Newton's law of cooling because cooling is transient behavior, and Eq. (4) is a steady-state equation.

[2] Year 2021 © 2021 Global Journals

[3] © 2021 Global JournalsWhy Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them

8. Ohm, G. S., 1827, The Galvanic Circuit Investigated Mathematically, 1891 English translation, Van Nostrand, p. Equations (**??**5) and (**??**6) are identical. They differ only because q and Î?"T are combined in Eq. (**??**5), and separated in Eq. (26). Equation (26) states that the numerical value of Î?"Ttotal equals the numerical value of Î?"T1 plus the numerical value of Î?"Twall plus the numerical value of Î?"T2. All problems that can be solved using Eq. (**??**5) and h can also be solved using Eq. (**??**6) and not h. If q{Î?"T} is a proportional equation, the solution is quite simple using either Eq. (**??**5) and h or Eq. (**??**6) and not h. However, if q{Î?"T} is a nonlinear equation, the solution is much simpler using Eq. (**??**6) and not h.

.1 50.

.2 Global Journal of Researches in

Why Conventional Engineering Laws Should Be Abandoned, and the New Laws That Will Replace Them qconduction x y

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