

The GH-Method

Viscoelastic and Viscoplastic Glucose Theory (VGT #108): A Summary Report on the Energy Studies Applying Time-Domain Squared Biomarker Amplitude, Space-Domain Viscoelasticity & Plasticity Hysteresis Loop Areas & Frequency-Domain Fourier Transformed Curve Areas for 100+ Medical Research Topics, Including Some Numerical Sensitivity of Applications of Physics & Engineering, and a Few Key Medical Findings from These 100+ Research Papers: Based on the GH-Method: Math-Physical Medicine (No. 698)

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Keywords: Viscoelastic; Viscoplastic; Carbohydrates; Sugar; Walking k-steps; Postprandial plasma glucose; Fasting plasma glucose; Type 2 diabetes; Fast Fourier transform

Abbreviations: FFT: fast Fourier transform; T2D: type 2 diabetes; PPG: postprandial plasma glucose; FPG: fasting plasma glucose; FD: frequency domain; SD: space domain; TD: time domain; MPM: math-physical medicine

1. INTRODUCTION

The author applies various theories and tools, including linear elasticity, nonlinear plasticity, wave theory in a time domain (TD) with fast Fourier transform into a frequency domain (FD), viscoelasticity, and viscoplasticity from physics and engineering disciplines to his selected medical research work. He conducts this biomedical research regarding the relationship between a single symptom biomarker or multiple symptom biomarkers versus a single cause biomarker or multiple cause biomarkers (in mathematical terms, 1×1 , $1 \times n$, $m \times 1$, $m \times n$). At below, is a brief explanation of these three distinctive energy analysis approaches or tools he has used:

The first approach is to estimate the TD energy associated with waveforms of input cause biomarkers by calculating and comparing the squared amplitude of the average cause values. Basic physics taught us

that “the energy carried by a wave is directly proportional to the square of this wave’s amplitude”. The TD energy ratio is squared cause no. 1 versus squared cause no. 2.

The second approach is to apply the viscoelastic or viscoplastic glucose theory (VGT) to construct a set of space-domain (SD) diagrams with stress-strain curves and then by calculating the enclosed areas of the 3 SD curves or hysteresis loops to obtain their respective SD-VGT energies. The SD-VGT method is useful in investigating the “time-dependent” biomarker behaviors which apply to the majority of situations in the fields of medicine, economics, and others. The SD-VGT energy ratio is hysteresis loop area no. 1 versus hysteresis loop area no. 2. The following 2 defined equations from viscoelasticity or viscoplasticity are utilized to study the stress-strain relationship in this case. Here, he wants to use the strain rate multiplied with the viscosity factor as the stress component:

Strain

= ϵ
 = individual output FPG biomarker value, i.e. symptom, at the present time

Stress

= σ
 = $\eta * (d\epsilon/dt)$
 = $\eta * (d\text{-strain}/d\text{-time})$
 = (viscosity factor η , i.e. BW, BT, O2) / (normalization factor) * (output biomarker or cause at present time - output biomarker or cause at previous time)

In a VGT study, we must carefully choose appropriate “normalization factors”, i.e. a factor associated with the “break-even line’s value between healthy condition vs. unhealthy condition”.

The third approach is to develop a newly-defined variable of (strain * stress) from SD as the new wave amplitude in a TD and then go through a fast Fourier transform (FFT) operation to calculate the enclosed area of this new variable created curve in an FD as the FD energy. The FD-FFT energy ratio is frequency curve area no. 1 versus frequency curve area no. 2.

It should be emphasized that all of the above-mentioned energy values, TD, SD, and FD, are relative energies, not absolute energies.

2. NUMERICAL SENSITIVITY OF PHYSICS & ENGINEERING APPLICATIONS

(1) At first, we decide the research type of m outputs or m symptoms versus n inputs or n causes (m x n). It can be 1 symptom vs. 1 cause (1 x 1), 1 symptom vs. multiple n causes (1 x n), multiple m symptoms vs. a single cause (m x 1), or multiple m symptoms vs. multiple n causes (m x n).

(2) Second, we decide the time window of data coverage’s time duration. This time duration can be a year, quarter, month, day, hour, minute, or certain specially selected time instants.

(3) Third, we must understand the biomarker’s unit and the dividing line between healthy conditions versus the unhealthy condition of each biomarker. The unit and breakeven level can be used as the

“normalization factor” of one particular biomarker dataset. For example, 120 mg/dL for glucose, BMI 25 for body weight, 6.0% for HbA1C, etc. Otherwise, the dataset with a higher unit or numerical value would result in a larger hysteresis area which means a higher energy level.

(4) For most cases in medicine, a higher value means unhealthy, the normalized biomarkers are the biomarkers divided by the breakeven number, for example, carbohydrates and sugar consumption grams divided by 20 grams. However, certain biomarkers may act oppositely, i.e. a lower biomarker value indicates unhealthy, the normalized biomarkers is then the breakeven value divided by the biomarker, such as the normalized post-meal walking exercise is 4 k-steps divided by the post-meal walking k-steps and the normalized HDL is 40 divided by HDL value.

(5) The strain is defined as the symptom value. We need to calculate the strain (symptom) change rate. For a normal situation, when the biomarker becomes healthier following a long time scale, the strain value then becomes a negative value and vice versa. This strain change rate determines the fundamental curve shape and also contributes to the hysteresis loop area size. We should also pay some attention to the initial value of the strain rate. Since most selected dataset starts from the first recorded data and lacks further prior time instant’s data, the first strain rate employs the first time instant’s data minus itself to have a zero value.

(6) The stress of each cause is defined as the strain change rate multiplying by the normalized cause (or viscosity). Then, this stress value multiplying by the strain change rate to become the y-axis data point’s value of the hysteresis loop at that particular time instant.

(7) The application of the trapezoid formula can calculate the enclosed area of the hysteresis loop. By summing up all of the data points of the hysteresis loop, we will obtain the total hysteresis loop area which represents the associated energy produced by the combination of a time-dependent symptom and time-dependent cause in SD.

(8) Finally, by comparing different summarized area data among different causes or different sub-periods, we can tell the energy difference between different influential causes and different time periods.

(9) For the TD energy analysis, we can calculate the squared value of each influential cause's average value. Basic physics has taught us that the energy associated with a wave is directly proportional to the square of the wave's amplitude. Almost all of the biomarkers in medical research, either outputting symptoms or inputting causes, are variables dependent on time and can also be presented with different waveforms in TD and study their correlation coefficients.

(10) For FD energy analysis, the author has defined a new variable of (strain*stress) from SD which contains information on both symptom and cause. (Note: the author has tried another less accurate variable of strain*cause/viscosity.) We can then use the FFT operation to convert this new variable's wave from a TD into an FD. Again, we can use the trapezoid formula to calculate the enclosed area of this frequency curve in FD.

(11) The most important point is that all of the calculated energies, whether using TD, SD, or FD are "relative" energy and not "absolute" energy. The main purpose of this energy analysis is to identify which inputting cause would create what degree of influence or damage to the selected outputting symptom.

3 VGT MODULE PROGRAMMING GUIDELINES

After conducting 100+ research tasks utilizing the SD-VGT and FD-FFT methodology, the author decided to develop a software module of VGT within his ready-developed APP ("Chronic"). The following steps outline its JAVA language-based programming guidelines.

- (1) Selecting the "Time" field which can be a year, quarter, month, day, hour, or minute.
- (2) Select the "Strain" field as the output which can be any symptom biomarker variable.

(3) Select the "n" set of the "Input of viscosity" field where n can be 1, 2, 3, or 4 (maximum for this APP).

(4) Both strain and viscosity inputs are corresponding with the "time" field.

(5) Establishing two different types of "Normalization Factors, NF", the first NF is "Input/NF1" (a higher number means a worse case) and the second NF is "NF2/Input" (a lower number means a worse case).

(6) Calculating the "normalized viscosity input, N. viscosity input or Norm viscosity input" for input i, where i=1, 4 (maximum for this APP).

(7) Calculating the "Strain Change Rate or Strain Rate": the time 1's strain rate = (time 1 strain - time 1 strain = 0), time 2 strain rate = (time 2 strain - time 1 strain), ... etc., i.e. time i strain rate = (time i strain - time i-1 strain).

(8) Calculating the "Stress" at the time i where time i stress = (time i strain rate * time i Norm. viscosity input), where i = 1, to end time.

(9) Calculating the "Height" of area: the time 1's height = (time 1 stress - time 1 stress)/2 = 0, time 2 height = (time 2 stress - time 1 stress)/2, ... etc., i.e. time i height = (time i stress - time i-1 stress)/2.

(10) Calculating the hysteresis loop "Area": the time 1's area = (time 1 strain rate * time 1 stress) = 0, time 2 area = (time 2 strain rate * time 1 stress)/2, ... etc., i.e. time i area = (time i strain rate * time i stress).

(11) Calculating the total area by summation of areas for input 1, input i, i =1,4, respectively, and then calculating the area i's percentage by (area summation up to time i / total area).

(12) Calculating FD areas by FD Area i = (strain * stress) at time i.

(13) Transfer the FD area into the Chronic APP's graph chart of the 5th selected column, and the software user can then conduct a separate Fourier transform operation to draw an FD chart with FD total area corresponding to input i, where i = 1 to 4. Also calculating

FD area i's percentage by (FD area i / total FD area).

4. SOME KEY FINDINGS FROM HIS 100+ MEDICAL RESEARCH PAPERS

4.1 Type 2 diabetes (T2D)

(1) The top influential cause of T2D is insulin resistance (IR) resulting from the glucose-caused damage to pancreatic beta cells' function. The fasting plasma glucose (FPG) in early mornings not only serves as an effective indicator of IR but also acts as the baseline for the postprandial plasma glucose (PPG) level. FPG has close connectivity with both body weight (BW) and body temperature (BT) but more with BW.

(2) The second most influential causes of PPG, after FPG or IR, are carbohydrates and sugar intake amount of each meal (carb) and post-meal walking exercise level by the unit of each 1,000 steps or k-steps. The energy ratio between carbs and k-steps to PPG is around 60% vs. 40% (1.5:1.0) which matches all of his previous research results using other MPM methodologies and the physiology pathological pathways of diabetes. The author further identified each gram of carbs/sugar would create around 2 to 8 mg/dL of PPG depending on the patient and situation, and each 1k-steps of post-meal walking exercise would reduce around 5 mg/dL of PPG. Therefore, the guidelines for his daily practice are 20 grams or less of carbs intake for each meal and also walking 4 k-steps post-meal within 2 hours of the first bite of meals. In the SD-VGT diagram, ~20 grams of carbs would have a viscoelastic behavior (defined as the initial data point meets with the ending data point) while >50 grams of carbs would have a viscoplastic behavior (defined as the initial data point has a big gap with the ending data point).

(3) For the hyperglycemic case (i.e. PPG > 180 mg/dL), it not only shows a viscoplastic behavior but also has an energy split between carbs versus k-steps of 75%:25% (a 3:1 ratio instead of viscoelastic 1.5:1 ratio).

(4) Consuming one "wrong" meal, i.e. eating a very high-carb meal, would result in a post-period of 10-days with the residual effect of higher glucose and higher body weight that

contributes 93% of total energy in comparison with the 10 prior days of PPG which contributes only 7% of total energy.

4.2 Chronic diseases

(1) The most important cause for all types of chronic diseases is being overweight (BMI=25-30) or obese (BMI > 30). Obesity not only influences diabetes but also has different influences on other chronic diseases with their induced medical complications, including but not limited to cardiovascular disease (CVD), chronic heart diseases (CHD), stroke, chronic kidney disease (CKD), diabetes retinopathy (DR), neuropathy, foot ulcer, bladder infection, dementia and variety of cancers. Obesity is caused by overeating, i.e. excessive food consumption with eating bad food quality, such as processed food, fat, chemical toxin, etc. The second important factor is lacking exercise.

(2) Genetic influences, including a family history of diseases, and lifetime unhealthy habits, such as alcohol drinking, cigarette smoking, and illicit drug use, have direct and strong effects on chronic diseases and their induced medical complications. However, these areas of concern are not included in the scope of the author's research work.

(3) Both sleeping hours (>7 hours) and reduced wake-up times during the night (an indication of health conditions for both kidney and bladder) are important for general health and chronic diseases, even heart diseases. The American Heart Association (AHA) has recently added sleep into its published "life-essential 7" to become a new "life-essential 8".

(4) The Triglycerides and Glucose Index (TyG) is an effective biomarker for both insulin resistance of the pancreas and non-alcohol fatty liver disease which has 33% contribution from triglyceride (TG) and 67% from fasting plasma glucose (FPG).

4.3 CVD, stroke, CKD, DR, and others

(1) The overall metabolism index (MI) has an extremely high correlation of >90% with the risks of developing complications of CVD, stroke, CKD, DR, and cancers. The energy during the earlier period of Y2010-Y2015 contributes about 93% to 98% of CVD/Stroke risks while the energy during the recent

period of Y2016-Y2022 contributes only 2% to 7% of CVD/Stroke risks, depending on the type of disease. The period of 2016-Y 2017 is the dividing line (i.e. the “game-changing” timeline) of his healthy period versus the unhealthy period.

(2) SD energy ratio of CKD vs. A1C: ACR: Bladder is 29%:27%:44% which shows the connection and influences of T2D, kidney, and bladder to the CKD risk. Among these 3 causes, ACR (biomarker shows the protein amount in urination) contributes the most with 44% of energy contribution to kidney diseases from this SD-VGT analysis.

4.4 Cancers

(1) SD energy ratio of most cancers risk vs. 4 chronic diseases: 6 lifestyle details is 63% : 37% or 1.67: 1.00. The reason of a higher medical condition’s contribution (63%) and the lower lifestyle’s contribution (37%) is that the author works hard on his lifestyle program but his medical conditions are the products of his lifestyle improvement effort and takes some time to see significant accomplishments (a delayed effect). By the way, the correlation between Cancer risk and CVD risk is 98% due to both risks being calculated largely using the same MI data.

(2) SD energy of all cancers risk vs. T2D: Obesity is 51% : 49%, almost equal influences on cancers. Energy ratio of earlier period versus recent period is 88% : 12%.

(3) SD energy of pancreatic cancer risk vs. Hyperglycemia : IR : BW is 1.6: 5.5 : 1.0 which shows body weight is the most important influential factor on pancreatic cancer.

(4) SD energy of liver cancer risk vs. A1C : BW : BP : MI is 32% : 27% : 18% : 23% which shows HbA1C is the most important influential factor on liver cancer.

(5) SD energy of 4 cancers risks vs. A1C : BW : Diet : Exercise is 30% : 25% : 18% : 28%. This shows the importance of glucose control (A1C) on risks of having 4 cancers.

(6) SD energy of prostate cancer risk vs. MI : BW : Diet : Exercise is 33% : 29% : 29% : 32% which have contributions quite close to each other.

(7) SD energy of kidney cancer risks vs. (T2D+BP+ACR) : BW : Diet : Exercise is 23% : 34% : 22% : 21% which have almost equal contributions.

(8) SD energy of gynecological cancers risks vs. (T2D+CKD+BP+IR+ACR) : BW : Diet : Exercise is 23% : 34% : 22% : 21% which shows the importance of weight control on gynecological oncology.

(9) SD energy of 5 cancers risks vs. 8 causes of (T2D, BW, MI, Diet, exercise, Blood Lipids, BP, ACR) CKD+BP+IR+ACR) : BW : Diet : Exercise is 30% : 24% : 14% : 13%, 10%, 6%, 2%, 1%. Again, this 8 cancer risks SD-VGT study has also identified the importance of type 2 diabetes control.

4.5 Neuroscience and mixed diseases

(1) The neuroscience study regarding the neural message transmission between stomach and brain, brain and liver/pancreas via 500+ days of experimental results from egg meals has identified that solid eggs contribute 53% of total energy while the liquid eggs contribute 47% of total energy which matches with his TD glucose research findings. In addition, 0-minute to 120-minutes contribute 68% of the total energy while 120-minutes to 180-minutes contribute 32% of the total energy.

(2) Investigating various biomarkers of A1C, MI, ACR, and TSH depicts some SD loops are viscoelastic and others are viscoplastic.

(3) General health index (GHI) versus 4 medical conditions (MC) and 6 lifestyle details (LD) has SD energy ratio of MC 54% vs. LD 46%; and FD energy ratio of MC 56% vs. LD 44% which is quite close to SD result.

4.6 Psychology and Economics

(1) SD energy of symptom vs. causes of both T2D and psychological borderline personality disorder (BPD) is 98% for T2D in Y10-Y14 and 2% for T2D in Y15-Y22; and 34% for BPD in Y10-Y19 and 66% for BPD in Y20-Y22. These two SD diagram patterns are opposite to each other which reveals no relationship between diabetes and BPD. During the COVID-19 quarantined years of Y20-Y22, T2D has been well under-controlled; however, the fear of the virus and

disturbance of life routines have disrupted psychological BPD symptoms.

(2) Thus far, 4 economic studies are using the SD-VGT energy tool which include (a) GDP vs. inflation and COVID death; (b) Inflation rate vs. COVID infection and COVID death; (c) CPI vs. COVID infection and COVID death; (d) GDP vs. inflation rate, CPI, and COVID infection. These 2 GDP studies have shown 2 causes of COVID infection at 69% and an Inflation rate of 31%; and 3 causes of COVID infection at 37%, CPI at 44%, and inflation at 19%. The Inflation study has shown COVID death at 52%, and COVID infection at 48%. The CPI study has shown COVID infection at 53% and COVID death at 47%. A summarized statement is that COVID indeed influences GDP, inflation rate, and CPI, while both inflation and CPI influence GDP as known from many other economic research studies.

5. RESULTS

Figure 1 displays a complete data table (6 full pages in one figure) from the author’s Excel file which has 101 VGT medical research results and 4 VGT economic research results.



Figure 1: Excel data table of his previous 104 research results using TD-squared amplitude, SD-VGT, and FD-FFT energy tools.

6. CONCLUSION

Based on the above-described quantitative (numbers from 0 to 9) findings using TD, SD, and FD energy analysis tools, the author attempts to summarize them by using an English language (alphabets from A to Z) description:

The American Heart Association (AHA) has recently, in June 2022, announced the new “Life’s essential 8” to replace the old “Life’s essential 7” by adding sleep into it. The heart essential 8 are body weight, glucose, blood lipids, blood pressure, diet, exercise, no smoking, and sleep. The author developed his mathematical metabolism index (MI) model in 2014. This mathematical MI model includes 4 chronic medical conditions: obesity, diabetes, hypertension, and hyperlipidemia; along with 6 lifestyle details: food and meals, water intake, exercise, sleep, stress, and daily life routines. His MI model is highly consistent with the AHA life’s essential 8.

The author further singles out 4 lifestyle details of diet, exercise, sleep, and stress as the most essential 4 components to achieve the goal of having a long and healthy life for every person. The analogy is that the table top supports the weight and goal of health and longevity whereas the table weight of health and longevity is further supported by its 4 table legs of diet, exercise, sleep, and stress. Regarding genetic conditions, you are provided with the table material and your healthy lifetime habits, avoiding smoking, drinking, and illicit drug use, are the required daily maintenance job for keeping the condition of the table to continuously sustain the weight of health and longevity.

It is worthwhile to mention stress. Many people have ignored the influence of stress on their health. This is why the author dedicated 9 years of his life to self-study psychology. He has suffered 5 cardio episodes which resulted from his diabetes conditions and highly stressful work from being a high-tech executive officer.

Body weight is the most important biomarker that everyone must pay attention to. Being overweight or obese may develop into chronic diseases including the 3 prominent key diseases: diabetes, hypertension, and

hyperlipidemia. The first and far-most critical disease is T2D which has occupied about 95% of the total diabetes cases in the world. Other than hair and nails, blood and blood vessels reach every part and organ in the human body. Blood cells inside both macro and micro-blood vessels carry both oxygen and glucose (similar to the fuel for a car engine) throughout the body. When a high glucose situation (hyperglycemia) happens, e.g. >150 or >180 mg/dL, higher associated energy is generated which would damage the human body and various internal organs. This is the reason the author spends his research efforts focusing on the energy level created by hyperglycemia and other chronic diseases. The 4 chronic diseases are shown by 4 significant biomarkers: body weight, blood sugar, blood pressure, and blood lipids. So, monitoring, understanding, and being able to control these 4 basic biomarkers are extremely important and they are the fundamental tasks for either health maintenance or health improvement. FPG in the early morning is the simplest way to know the health condition of our pancreatic beta cells. Therefore, it is essential to protect them by reducing hyperglycemic situations, so that glucose production from the liver does not overwork and affect the pancreas. Furthermore, by combining FPG and triglyceride together (i.e. triglyceride and glucose index of TyG) can indicate the degree of seriousness of both insulin resistance of pancreas and non-alcohol fatty liver diseases.

In addition, FPG and body weight data have over 90% of the correlation coefficient which are highly correlated to each other. The FPG level determines the baseline of the post-meal glucose or PPG. Other than FPG, carbohydrates/ sugar intake amount (carbs) and post-meal exercise or walking exercise (k-steps), are the next two critical elements of PPG control. In terms of knowledge required to understand the real essence of both diet and exercise, diet is far more complicated than exercise. For the T2D case, the ratio of most energy contribution on glucose for carbs vs. k-steps is around 60% vs. 40%, or diet is 50% more important than exercise.

Many medical complications are either directly or indirectly related to these 4 chronic diseases, including CVD, CHD, CKD, and DR, and even diabetic constipation and skin fungal infection which are non-life threatening but are uncomfortable and

annoying. Among the medical complications, macro-blood vessels or arteries related to stroke and CVD are the most dangerous diseases which have been ranked the number one cause of death in the US for many years. Through the author's TD-squared amplitude, SD-VGT, and FD-FFT energy analyses, it indicated that both obesity and T2D are the two key influential causes of most cases of CVD.

Cancers are the most complicated and dangerous medical condition and have been ranked the number two cause of death in the US for many years. Of course, cancer has several hundred different types which are generally defined by the initially discovered organ location. However, despite certain unique causes and organ locations, most of the influential causes for a variety of cancers are universal and consistent. Therefore, the author has spent much of his recent research efforts on genetic cancer risks, in addition to 5 individual and specific cancers: kidney, liver, pancreas, prostate, and gynecological (ovarian and uterine). The cancer risk model, similar to both CVD risk and CKD risk, is based on his developed MI model which includes 4 chronic diseases and 6 lifestyle details. The SD-VGT results have demonstrated that multiple causes are contributing to cancer risks with various patterns of individual energy distribution percentages. But, from those individual energy contribution percentages, we can identify some subtle differences in influences from various causes.

In summary, from the most important lifestyle details, diet (both quality and quantity) and exercise, we can reduce and maintain our body weight, and then glucose, finally blood pressure and blood lipids. When these 4 chronic diseases are under control, most of the other medical complications, including cancers and dementias, will benefit as well.

The above-mentioned diseases have occupied almost 80% of the total death cases in the US every year. The remaining 20% of deaths cases are 10% from infectious diseases (COVID is an exception for Y2020 and forward), 10% from accidental death, and suicides.

In the author's case, obesity started around 1985 when he was 39 years old, and his T2D

conditions started approximately in 1995 when he was around 50 years old. By 2005, he suffered from 5 cardio episodes at age 60. In the summer of 2010, at 63 years old, his kidney sounded its alarm (ACR at 160, normal level at 30) which was his wake-up call. He then began to self-study internal medicine and food nutrition in 2010. He started to research and develop various biomedical models utilizing his ready-learned knowledge and skills from mathematics, physics, and engineering disciplines (the MPM Methodology). Within the entire year of 2014, at 67 years old, he developed his metabolism index (MI) model which is the building block of his follow-on medical research work. By 2017, most of his key biomarkers have turned into a healthy state.

Using the 3 different domain's energy analysis tools, he has observed another two key phenomena:

First, the energy associated with Y2017-Y2022 is around 2% to 7 % in comparison to 93% to 98% of Y2010-Y2016. His earlier years' energies are 14 times to 46 times higher than his recent years energies, although his "measured biomarker improvement" in terms of recent years versus earlier years is only in "percentages", not in "times".

Second, when the biomarker value is "linearly" growing, i.e. getting worse and being unhealthy, the energies associated with those biomarkers are growing "exponentially", i.e. becoming dangerous or life threatening. This shows the real threat and the amount of organ damage resulting from the worsened biomarkers. This

observation can be explained by his defined energies are either (squared biomarker) or (symptom biomarker * cause biomarker), i.e. (strain*stress). This medical situation is somewhat similar to Newton's gravity law of "Weight (w) = Mass (m)* Gravity acceleration (g)" or Einstein's theory of relativity of "Energy (e) = Mass (m) * squared light speed (c**2)". After all, medicine should also be a branch of physics and most of the biophysical phenomena do follow the basic physics laws.

7. REFERENCES

For editing purposes, the majority of the references in this paper, which are self-references, have been removed for this article. Only references from other authors' published sources remain. The bibliography of the author's original self-references can be viewed at www.eclaircmd.com.

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