for mapping a language's sequence to the existence of a recursively enumerable model.

One of the open questions regarding prime numbers is "Does a syntax for the prime numbers exist?" We can confidently say yes. Our "2-4-2-4-2-4…" sequence points us to the core syntax of a regular language. In the threads, the zero multiples of 6 (where $z = 0$ in our $6z$ function) act as bound items on the 2 and 4 threads, as if contained in a primitive recursive function [11]. That is, we know for certain that there are a definite number of zero elements on those threads.

The case is not the same for the zero elements on the bonds between the threads, where the 2-4 and 4-2 bond sequences tell a different story. These zero elements may be considered free or nondeterministic…we don't know how many really should exist between bonds, or if the number varies with growth. Their free zero elements indicate an openness of a pumping lemma, making those bond portions not regular languages [12]. When we think of these zero elements in the bonds it might be best to consider them as compressible, as in a sparse matrix.

6 Parallels in WSEAS Research

Now that we introduced some general approaches to conceptually applying the structure to physical-differential functions and the logical syntax-language problems, we now review some practical research that aligns well with these approaches. In this section of the paper we will consider how to apply this mindset and concept to previous research done by other mathematicians, scientist and engineers in World Scientific and Engineering Academy and Society (WSEAS). We will attempt to consider how this new concept for prime numbers might supplement, some of the detailed research done in the areas of number theory, electron mass, vectors from electromagnetic molecular bonds, and the potential impact on data integrity in cryptanalysis.

6.1 Concept Change in Number Theory

We have two new concepts to consider from the double thread elliptical behavior combined with the harmonic influence of $6z$. One concept is that we have an independent function (z^3) being applied to specifically controlled positions on a constantly accelerating structure. Why should we consider the z^3, or $6z$, function(s) as independent? The answer is that we have a problem with going straight to the

typical harmonic partial derivatives and dealing with the product rule. The problem is that the core x^2 and $2y^2$ function after a partial form is applied yields the even scalars of 2 and 4. But, the sums of the $6z$ function also have odd scalar patterns. The pattern of 0-1-1-3-1-1-0 is a good example (in the third vertical rod of the 10-step model). Even determinant approaches would suffer likewise. This is our strongest indication that the $6z$ function, hence the z^3 function, is independent of the x^2 and $2y^2$ function, except with regard to positional location.

Recent research done with logical approaches to biological computational and combinatorial complexity also support initially and temporarily viewing system components independently. The authors proposed a paradigm shift to first find a deterministic solution and then search for a stochastic solution. By using this approach, we can "reduce the search space of the problem by dividing initial data into two groups: a group of initial data which are relevant for the optimal decision and a group of data which are irrelevant for the optimal decision" [13].

That is exactly the type of approach we take by isolating the amazingly consistent 2-4 thread into an initial group. As a result, this step helps determine the possible solutions for the more detailed and complicated behavior of $6z$. In our case, the 2-4 threads provide "knowledge about the distribution density for elements of the optimal decision could support us in creating algorithms for finding an optimal (suboptimal) combinatorial problem solution" [14]. Maintaining a level of independent structure in further analysis of the prime numbers may prove to be essential.

The other concept is really a philosophical question: What if we really have an integer physical model that defines the generic behavior of the complex plane?

6.2 Electron Mass

Could the obvious location-based dependency between our two groups of functions ("x^2, y^2", and "z^3") possibly be comparable to mass and changes in its orbital rate as it accelerates over the speed of light squared? What would Einstein think about this? Maybe one of our closest connections can be considered when we reflect on the work done regarding the harmonic frequency in the noise of electron mass.

Planat, a WSEAS author, expanded on the "recently discovered a possible relationship between $1/f$ frequency noise in oscillator measurements and prime number theory". The result of his work was in

"relating exact statistical mechanics of electrons of mass m in a box of size L" [15]. If we consider the statistical and frequency-based oscillations of a physical system in connection with their behavior on the complex plane, we might have a significant connection to our prime number integer structure. If we can envision these frequencies on the complex plane, can we relate them to our integer prime number structure? Equally, what if we defined locations on the complex plane by their relationship to our physical prime number structure?

This would be an integer approach to harmonics with the same concept that "the degeneracy of energy levels needs the extended frame of algebraic number theory (and the field of quadratic forms)" [15]. This may not get as much endorsement since an integer model based on second derivatives is against the traditional approach of using an "integral representation of gamma function" which "generalizes the factorial function into the complex plane s" [16]. The hope is that further research in this area will simplify an approach to modeling problems in the complex plane without some of the awkward integrals that would normally result. The concept of these patterns being energy based will also become significant in out next section regarding molecular bonds.

6.3 Vectors from E-M Molecular Bonds

We continue with the concept of an energy-driven physical model for the growth of prime numbers when we think of intrinsic quality of DNA. "Various base sequences in DNA have different energy of interaction between base pairs; this difference modulates the fine structure of the helix" [17]. As a result, we can expect to see a form of modulation, whether as a result of mass and acceleration or another form of harmonic movement when we manipulate the double-threaded prime number structure to corresponding molecular electromagnetic properties of the DNA bases.
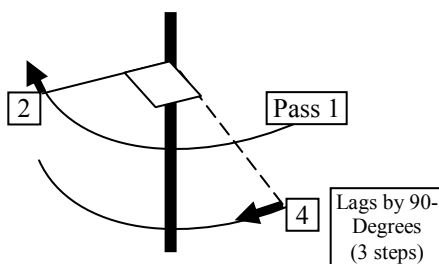

Fig. 2. E-M configuration of 2-4 thread model

When we manipulate the double-threaded structure, we should also be aware how the possible application of the sums of second derivatives may be closely related to the concept in cellular automata (CA), where "basic results on CA deal with additive global dynamics owing to their algebraic structure" [18]. We keep both of these concepts in mind when we apply a (90-degree) structure since "[m]inima with nearly perpendicular base arrangement are important for interactions of the duplex with monomers, as well as for intermediate steps of helix unwinding and of pair formation" [19].

Okay, how do we apply this? Fig. 2 illustrates how we advance the 2-thread three steps in a 12 step per 360-degree model. We force a physical 90-degree relationship between the 2-thread and the 4-thread structure. This gives us a sine function from the 2-thread and a cosine function from the 4-thread. In other words we are showing the total combination of "$\sin(pi/6, 6z) + \cos(pi/6, 6z)$." Something very interesting happens when we do this.

Table 5 Applying E-M model to prime numbers.

Pass	Thread	Extend 10	11	12	Step 1	2	3	4	5	6	7	8	9	10	11	12	Extend 1	2	3	4
1	2	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0				
	4				0	0	0	0	0	0	0	0	0	0	0	1				
2	2				0	0	0	0	0	2	0	2	0	1	1	1	1			
	4				0	1	0	0	0		0	1	0	0	1	0	0			
3	2				0	0	1	0	1	1	0	0	0	0	0	0				
	4				0	0	1	1	0		0	0	0	1	1	0				
4	2	1			1	1	1	1	1	2	0	0	0	2	0	2				
	4		0		1	0	0	1	1		0	0	1	1	0	1				
5	2	1	0	1	0	3	1	1	2	1	0	0	0	0	0	1				
	4		0	0	0	0	0	0	1	0	0	0	1	1	1					
6	2			1	0	1	1	0	0	0	0	1	2	0	1					
	4		0	1	0		3	1	1	0	1	0	0	0	5	1	0			
7	2		0		0	0	0	1	1	1	2	0	0	3	0	0	0			
	4				0	0	0	1	0	0	0	0	0	0	0	1				
8	2			1	0	1	0		2	0	0	0	0	1		1	0	0		
	4		0		0	0	1	1	0	1	2	0	0	1	2	3	0	2		
9	2				0	2	0	0	0	0	0	1	1	0	1	0	0			
	4				0	0	1	1	1	0	1	2	0	1	0	2		0		
10	2				1	0	0	1	0	1	1	4	1	0	0	1	0		0	
	4				0	2	0	0	3	0	0	0	0	0	1	0				0
11	2				2	0	1	0	1	0	0	1	2	0	0	2	2			
	4		0	2	3	2	0	1	0	0	0	0	1	0	0	1	1			
12	2			1	1	1	1	2	0	0	1	2	1	3	0	4	0	2		
	4		0		0	2	0	0	1	1	0	4	1	0	0	0	0			
13	2	0			0	1	1	0	0	0	0	0	0	0	3	1		2		
	4				1	2	0	0	0	3	0	4	0	0	1	2				
14	2				0	0	1	0	0	0	0	xx	xx	xx	xx	xx	xx			
	4				2	2	0	0	3	1	0	1	xx	xx	xx	xx				

Table 5 is the result of applying the 90-degree bond concept to the 2-4 thread structure. The 2 element that corresponds to the first 4 element in the

first pass is 3 steps (90-dgrees) ahead; that is why it is in the extended area to the left of the main 12-step structure. This E-M approach will focus on the multidirectional vector relationships.

In Table 5, the blackened cells with white text are the convergence point for equivalent vectors. These blackened cells are also the large gap jumps in the prime numbers (on the 2-4 threads). Since many vectors overlap, portraying the overlapping and intersecting elements is tricky and we have pushed the limit for the number of vectors displayed to show the significant amount of data. The easiest way to see the vector patterns is to start at a blackened cell and follow the vector with a single color and cell pattern outward. A clear example is gained by starting at the blackened "3" in the 4-thread element at step 3 of the 6th pass. The vector 1-0-1-0-1 goes up from the "3" both vertically and at 45-degrees.

This same approach can be done for all values greater than 1 with consistent vector results. Vectors with only 1 and 0 may seem trivial but they also exist and are most like at the core of a contributing recursive structure. There are definitely more patterns in this structure, but it is beyond our graphical depiction and capability for just one table. Hopefully, the reader will agree that the vector patterns of these $6z$ vectors do not act independently and the components of $6z$ are dependent fucntions.

The author attempted the same approach with a 20-step model and advanced the 2-thread by 5 steps to achieve the same 90-degree affect. That model yielded no significant results that were either consistent or worth mentioning. But, why didn't it work for that model? The best reason may be that our 12-step model is based on 30-degree steps, and a 30-60-90 degree model has the cleanest relationships and values for our driving functions of sine and cosine.

So, what's the big deal? The big deal is that the forced sine-cosine sums of vectors and electromagnetic fields seem to be the strongest model we have. Euler's formula with a definite cosine-sine relationship on a complex plane may be at the core of the nature of the incompressible harmonic and biologically-related physical growth of the prime numbers. Now, that is a big deal!

6.4 Impact on Cryptanalysis

With regard to cryptanalysis, we may be able to apply another level of security and integrity. This is always a concern for our Information Assurance engineers, who continually look for better forms to ensure non-repudiation and data integrity. We consider the two basic functions in signature

schemes: "p, q large prime number with $q \mid (p - 1)$" and "Y_U the public key of user U, where $YU = g^X_U$ mod p" [20].

How could we protect the integrity of the key if we considered that $p = 5 +$ {the threaded sequence and influence of $6z$}? We could use the following six parameters as a type of checksum for data integrity:

1. The coil number.
2. A binary flag for 2-thread location.
3. The position in the 2 to 4 bond.
4. A binary flag for 4-thread location.
5. The position in the 4 to 2 bond.
6. The last multiple of $6z$ incremented.

For example: Prime number 29 would be defined in this integrity scheme as 3-0-0-0-1-1. If we accept this as a standard approach, a common look-up or reference table for all prime numbers can be easily generated the same way the double-threaded structure was built with the modulo 6 operation. An inexpensive step to improving current data integrity might be a serious benefit to this approach.

In a related recent WSEAS research effort, the authors "pointed out that the problem within Li *et al.* scheme is that the verifier cannot confirm the correctness of the parameter made by the original signer from the received proxy signature. This problem is the fundamental problem of Park and Lee's nominative proxy signature scheme" [21]. Our extra checksum approach might help with this issue.

7 Conclusion

A 5-step or 10-step double helix model for the prime number growth based on the perfectly repeating 2-4 series from performing a post "modulo 6" operation was the driving structure that indicated we are on the right path for understanding the prime numbers. Considering the prime number cylinder flow models as an expression of the sums of second derivatives was proposed. The multitude of perfectly reversing and 90-degree rotating significant sequences cannot be ignored.

An interesting multi-directional vector model becomes apparent when we force the 2-thread as a sine function and the 4-thread as a cosine function. Indications are that there may be interesting connections between this Euler type approach and nature of prime numbers.

Tools and methods for manipulating, applying, and implementing these core model structures and concepts must be taught to the current and the future

generations of engineers, scientists, and mathematicians.

No turning back now! Let the flexible double threaded highway pave the path to adapting the physical power and property of the prime numbers' incompressible sequence to reach new computational destinations we could not otherwise obtain.

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