A Return to Bode

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Today I am doing something I should have done a long time ago: simplify my Bode's Law solution of 2009.

That paper still ranks #7 for a general search on Bode's Law at Bing and Yahoo, being the first non-institutional result. It topped out at #5 at Google before being censored by them in 2020: it no longer appears in searches there. But despite being censored in 90% of searches, it remains probably THE most-read paper on the topic ever, and has fallen only two spots in these uncensored searches.

I normally go back to important papers like this and restate my case in several forms, to be sure my audience is getting it. But I guess this one seemed so straightforward to me, I didn't bother. I live in my own little world, as we all do, and it is difficult to gauge what other people are getting, not least of all because readers don't always want to admit they aren't following you. So this is for all of you who may not have understood what I was doing there.

The math in that paper is very simple, so I just assumed it didn't require much explanation. But on a new rereading after 14 years, I could see that I could have been clearer on exactly *why* I was doing what I was doing. Like you, I was taught in math and science classes to show my work, and I tend to do that very fully, unlike most others in the field. But in this case, I failed in a few places to show my thought process along with the math, so many jumped to the conclusion I was just arbitrarily juggling numbers, or worse, pushing them. So let's go back and simplify and clarify at the same time.

The first thing to understand is that this is a unified field solution. It comes out of my unified field work, where I showed the celestial field is a dual field of gravity+charge. There I show that Newton's field equation is and always was a unified field equation, including charge implicitly. So in this Bode problem, what I wanted to do find a way to split the field as I did there, solving Bode first as a gravity equation, then as a charge equation. As you know, in its current and historical form, Bode's Law isn't a unified field equation. It isn't even a field equation. It is just a simple equation Bode tried to force-fit to the known numbers.

But since Bode's Law is roughly correct, my first assumption was that the numbers it was spitting out were accidentally following the right sequence, with some margin of error caused by the incomplete and oversimplified math. For this reason, I wanted to write it in a different form, a form I could then add my charge field to, getting a unified field equation. I have used this method successfully in many other problems, and I am now known (by some) as being adept at this sort of math/physics trouble-shooting. I am pretty good at it because I allow myself to feel my way through the problem, visualizing what needs to be done before I start doing any math. It also helped in this case that I had already done a lot of work on the orbital problem, rewriting and debugging Newton's old equations, including the basic equation $a=v^2/r$. In that paper from 2004, I showed that linear math had been imported into angular math illegally, causing several fatal problems. I showed that disclarities in Newton's calculus proofs had also caused some rather large errors, ones that required me to rewrite the foundational orbital equations. One of the things I found in that rewrite was that the orbital acceleration had to be expressed as a function of $\sqrt{2}$.

So the first thing I did with Bode is assume the main sequence was expressing a series of orbital accelerations, and their relationships as we moved out from the Sun. Or, to say it another way, Bode's Law needed to be written not as some free-floating math, but as a function of these real orbital equations. To do that, the first thing we need to do is write them in terms of $\sqrt{2}$. I found that easy to do in the first instance, giving me an early indication I might be on the right track. Once I had the terms written in that way, I noticed a simple buried exponential relationship in the sequence, which allowed me to rewrite the gravitational part of Bode's Law as

$\sqrt{2}[1^2 + (1^2 + 2^2) + \ldots + (n-4)^2 + (n-3)^2 + (n-2)^2 + (n-1)^2]$
or
$\boldsymbol{\sqrt{2}[6 + \ldots + (n-4)^2 + (n-3)^2 + (n-2)^2 + (n-1)^2]}$
where n=the nth planet

One of the things I left out of that original paper is that general replacement for Bode's Law. Since that is only the gravitational part, not including charge, I didn't bother reducing it to a single general equation. I didn't want anyone ignoring my charge additions and thinking that was my replacement for Bode's Law, so I didn't write it down like that. I just wrote the list for all planets.

Obviously, that gives us no number for Mercury, but for the rest of the planets it gives us a sequence that fits the actual numbers for the planets' orbits about as well as Bode's Law. This new sequence is far worse as a predictor of Uranus, but far better as a predictor of Pluto. So far, that gives us no real reason to prefer it, but I reminded you of two things:

1) In this new form, we can see how the Law comes out of the orbital equations. In its current form, Bode's Law is based on the sequence 3, 6, 12, 24, 48, which is a simple doubling. It is not to the exponent 2. But in my form, we can start to see where the numbers are coming from, in expressing the real field. Since the gravitational field is based on the inverse square, Bode and others should have always been trying to express the Law based on that. But it goes beyond that, because with my equation we get an even finer understanding of how the field works than we had with Newton. Since each term stands for a planet, we can see that planets aren't just orbiting the Sun. They are orbiting the Sun *and* all the planets beneath them, and this is clear even before we start adding the charge field. So far we have just found a first-order approximation of the field, based on the inverse square law and the nature of solo gravity, but already it is far superior to what we had with Bode.
2) Now that we understand that outer planets are orbiting the Sun + inner planets, we see that the planets outside Jupiter must act differently than inner plants, since they are orbiting Jupiter as well as the Sun. Jupiter is a huge dividing line in the Solar System, but in its current form Bode's Law takes no account of that. Bode's Law is overgeneralized and oversimplified, because it applies to all the planets the same, regardless of position. Jupiter is treated like all the other planets both gravitationally and as a matter of charge emission. Or, to say it another way, Bode's Law is just as good outside Jupiter as inside. Bode's Law doesn't start missing bigger outside Jupiter, though we would expect it to. Bode's Law hits Uranus almost exactly, which should have always seemed very strange. I show this is just a fluke, and we should have always known that because the Law, as written, doesn't have the resolution to hit an outer planet perfectly. But my new equation—in its first-order form—DOES start missing worse outside Jupiter, which is actually another selling point. It again told me I was on the right track. Why?

Because once I started adding in my charge field, I needed more room for it once I hit Jupiter. The charge part of the unified field equation gets larger with those larger planets, so I needed the first-order equation to miss out there. I needed some big gaps to fill, you see.

OK, that was the first half of the paper. Next I needed to add in the charge field. But before I got there, I needed to look at the holes I needed to fill. So I went to the known orbits of the planets and calculated how much my new equation missed with each one. I was hoping, of course, that I could fill those holes with my charge field. I was hoping that the charge field perturbations between the planets would push them right into fitting given data.

To do that, I needed to calculate charge forces between the four big planets, or perturbations. This is because the planets are orbiting the Sun, they are orbiting all planets below them, AND they are excluding one another with real charge fields. To predict orbits, we need to calculate all three things.

To do this, I treat charge as a simple exclusionary or repelling force. Rather than think of EM and attractions and repulsions, I prefer to visualize charge as a hail of real photons. At the most basic level, that is what it is, and it can be treated that way in these fundamental orbital equations. It is like the planets are driving one another off with water hoses. The planets, like everything else, are recycling real charge in the form of real photons with real energies and radii. This creates forces that are easily calculable if you have the right mechanics. It is just that no one ever had the right mechanics before me.

You really need to know only two things to get this right:

1) The charge of a planet is determined by its mass *and* its density. It is a function of both, and you can't just use one or the other. To compare the forces of planets, you just multiply mass times density, MD, to get a charge density. That force then falls off (or increases) with distance, depending on the situation.
2) Charge moving out from the Sun acts completely differently than charge moving in towards it. This is due to the shape of the field, and nothing else. So charge moving from Jupiter to Saturn acts completely differently than charge moving from Saturn to Jupiter. Why? Because charge follows radial lines when it moves back toward the Sun, getting compressed along the way. Its density increases. This is because it is entering smaller and smaller shells. It is simply a function of radiation movement in a spherical field. Conversely, radiation moving out from the Sun or from an inner planet loses density by the same mechanism, but since we are looking at a charge field *inside* a gravitational field, we have a stacking of fields. Both fields diminish by the inverse square, so the force we are looking at diminishes by the inverse quad.

To get a force between two planets, we have to calculate forces in both directions. In other words, we have to calculate the force of Jupiter on Saturn and the force of Saturn on Jupiter, taking into account the direction of the force. We then add up all the resulting forces of the big four planets on one another, giving us a total charge variance for each planet.

To calculate a force for this field correction, I didn't need to calculate an actual force, using the given mass of the planet and so on. I just needed to compare forces, using one planet as a baseline. So if Uranus, the smallest planet of the four, has a charge density of 1, Jupiter has a charge density of 22.84, for instance. This simplifies the math, while at the same time making the mechanics more obvious. I have shown that physicists tend to get lost in their math, losing sight of the mechanics and the field they are trying to express, so I try to use the most transparent and shortest math at all points. But mainstream physicists aren't used to doing field math this way, so although it is far simpler than the operator/calculus they like to use, sometimes they can't follow me. I am trying to teach them to be more visual (and not to rely on their cheating operators), but many of them have been taught visualization is for losers, and they balk.

Using this simple field math, I was able to match my unified field to known numbers to four decimal points. As you see, this is a unified field five-body problem (including the Sun, which sets the main field). This has never been done before.

Now to answer some other questions. In the part where I am calculating a perturbation from Neptune to Uranus, I say that because Neptune is larger and above Uranus, the number I achieve is negative. How can I get a negative perturbation in a field of no real attractions? I have explicitly defined my charge field as repulsive, so what is happening? Well, this does NOT imply Neptune is pulling on Uranus, moving it higher. Just the opposite, in fact, since it is simply a result of the vector math I am using. I have simplified the math to the greatest extent possible, allowing us to calculate by scaling each individual set of planets to the greater Solar field, while at the same time using only exponents and roots. So the negative number from Neptune to Uranus only means Uranus is being repelled by Neptune more than it is being repelled by Jupiter and Saturn.

By my method, to fit all these perturbations to one another, the Neptune/Uranus perturbation has to be scaled to our first perturbation, that of Jupiter/Saturn. Because Jupiter is larger and below, the charge wind in that Jupiter/Saturn perturbation is moving out. Jupiter is blowing out more than Saturn is blowing in. So our unified field correction is OUT across that entire perturbation, both Jupiter and Saturn. But because Neptune is larger and *above*, the charge wind in that perturbation will be moving toward the Sun, or opposite the Jupiter/Saturn perturbation. So what the negative number indicates is not an attraction, it indicates the Neptune/Uranus perturbation is negative as an overall field vector to the Jupiter/Saturn perturbation.

This should have been big news back in 2009, not only because it is a unified field solution to a real Solar System problem, but because it is a five-body problem (or ten-body problem) that can achieve any level of accuracy you desire, with no chaos. Once we understand how the charge field fits into the unified field, we no longer have remaining inequalities or chaos. And that is because we have replaced faulty math with the correct math. It was always the math that was causing the appearance of indeterminacy and chaos, not the real field.