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The Cause of Axial Tilt
Part 1

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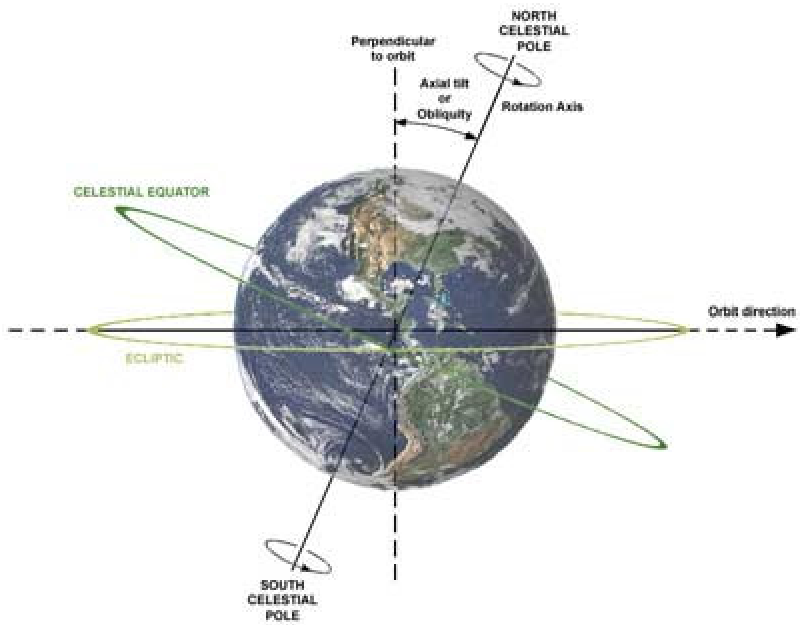


Abstract: By doing simple calculations on Mercury, Uranus, and the Earth, I will show that the tilts are easily calculable from perturbations, and that these perturbations can be calculated from only three numbers: mass, density, and distance. This will overthrow the entire history of Celestial Mechanics.

Here we have yet another example of extreme negligence by the mainstream. This problem, like a thousand others, is passed over as uninteresting, while we aim our telescopes at the edge of the universe and conjecture extensively about the first few seconds after the Bang. It would appear that real problems, close at hand, are too difficult, and we must misdirect all attention into the esoteric and arcane, billions of light years beyond our data and understanding.

If you do a websearch on this question, as I recently did, you find that the answer is "a collision." Yes, it is thought that all the planets gained their various tilts by accidental collisions in the distant past. That answer is so gloriously lazy and uninspired that at first I could not believe it. I thought that perhaps I had arrived at the Flat Earth PR page, and was reading another hedge from the hedge. But no, this is apparently as good as we can do on this one. It is somewhat like finding a squashed highway cone in the street and assuming it grew there that way.

It may be that the reason mainstream physics has never even tried to solve this one is that it doesn't have the tools to do so. Although the problem doesn't seem that difficult, on the face of it, it does require you to have a few cards in your hand, a few broad ideas in your head. One of those broad ideas is the E/M field, which the mainstream has never had in its celestial mechanical hand. True, the mainstream knows that the tilt is the tilt of an axis, and they know that the axis seems to have something to do with the E/M field of the body, but they don't know that distant bodies can effect each other via that same E/M field. Not so long ago, they didn't even know about magnetospheres and plasmas. Now they will admit that the near environs of a body can be affected by E/M fields, but they still resist letting that field permeate the Solar System. Why? Because if the E/M field got involved in perturbations, several major fields of enterprise would tremble at their very cores. Perturbation theory and chaos theory would be in danger of ultimate extinction, and gravity theory would have to be overhauled from the foundation. These astrophysicists would also have to admit that Velikovsky was at least partially right, and they would rather tear out their own eyeballs and eat them than go there.

Well, it is all very sad, I am sure, but the winds will blow and the grass will grow. I have shown that Newton's http://milesmathis.com/g.html and Kepler's own equations http://milesmathis.com/ellip.html contain the E/M field, in very simple form, and always have. This means that the mainstream physicists can keep their prized equations, but they will have to re-adjust their belts in some rather conspicuous ways. The unified field they have sought for a century was hiding in plain sight, and it will be an eternal embarrassment to generations of ghosts to have missed it, and to have looked for it in strings and bosons and dark matter and so on.

This E/M field is the card I had in my hand that allowed me to see through the tilt question immediately. You only have to look at a few lists of numbers to get a feel for the solution. Let us list the actual tilts of the eight planets, then list masses relative to the Earth, then list the relative distances between planets, with Mercury's distance as 1.

0.01	0.05	1
2.6	0.82	0.86
23.4	1	0.71
25	0.11	1.33
3	318	9.5
26	95	11.3
97	14.5	22.7
28	17.1	28

The first thing we see is that we have four planets within a few percentage points of one another. The Earth, Mars, Saturn, and Neptune all have similar tilts. That is unlikely to be a coincidence. If we measure those four tilts relative to the Sun's equator, instead of relative to their individual orbits, the numbers are even closer, being 30.55, 30.65, 31.51, and 34.4. Another big clue is

Mercury, with no tilt. And the final big clue is Uranus, with a near 90^{o} degree tilt.

Let's start with Mercury. Like all other planets, Mercury has bodies on both sides of it. On one side, we have the Sun; on the other side, Venus. Because the Sun is so huge, it overwhelms all other influences. So we may treat Mercury as perturbed only by the Sun, in the first instance. Mercury orbits very near the Sun's equator, at an inclination of only 3 degrees, 4 degrees closer than the Earth. Mercury is also furthest from the invariable plane, and this proves again that it is influenced more by the Sun and less by Jupiter and the other planets, as would be expected. But it must be influenced by the charge or E/M field, in this case. Mercury is matching its tilt and inclination to the Sun, and in doing so it is matching itself to the ambient E/M field, not the gravity field. The gravity field has no mechanism for influencing Mercury's tilt or inclination, since it is all the same to gravity whether Mercury orbits east-west or north-south. The field equations of Kepler, Newton, Laplace, and Einstein all fail to provide a mechanism for tilt or inclination, which is precisely why current astrophysicists still give tilt and inclination to accident or collision.

In a moment I will show exactly how the charge field (which I have shown underlies E/M) causes this phenomenon, but for now let us just look at the effect. I propose that a body that is perturbed by a charge field from only one direction will have no tilt, and that a body that is perturbed equally from two opposing directions will have a tilt of 90^{o}. Tilts in between are caused by uneven forces, and may be calculated from the sizes of the forces.

Just to be clear, I am proposing new perturbation theory. Below, I will solve multiple-body problems by calculating real mechanical forces upon those bodies. This will be the first serious mechanical work done on the field since Laplace "perfected" Newton's equations 230 years ago. Because Laplace's equations were so successful as a heuristic model, no one has bothered to try to prove that he was completely wrong, as a matter of mechanics. Yes, Laplace's equations are celestial math, not celestial mechanics. Neither Laplace, nor for that matter Newton or Kepler, ever did any celestial mechanics. And no one has done any since then. Conversely, my equations below will be shown to be fully mechanical. My charge field cause forces by bombardment. That is, *particles must touch*. There are no attractions and no forces at a distance, not in the gravity part of the unified field and not in the charge part of the unified field. The entire unified field is mechanical, and resolves to motion and contact. All equations are explained and underpinned, and all the math is simple and transparent.

So, back to Mercury. In this case, Mercury has almost no tilt because the Sun overwhelms the field coming from the other direction. We can even do a bit of rough math here. Mercury's tilt+inclination relative to the Sun's equator is about 3.39^{o}, which is 3.76% of 90^{o}. The mass of the rest of the Solar System is about .134% of the Sun's mass, and the average distance of the mass is about 23 times the distance of Mercury.

23 x .134% = 3.1%

That is why Mercury is tilted. The Sun is 97% of the effect, so Mercury can tilt only 3%. That is very rough math, since you have to calculate each perturbation separately, but it gets us started.

You will say, "Good Lord, shouldn't you have divided by 23 rather multiplied? The planets are further away from Mercury than the Sun. Surely the charge diminishes with distance? In other papers, you show the charge field diminishing by $1/R^4$." Yes, I show that when the charge field leaves a given spherical body, it diminishes by that rate. But that is not what is happening here. The charge field of the Solar System has to be taken as one spherical field. Imagine that the Solar System is one big ball. When charge is emitted out from the center of that ball, it diminishes. When it is emitted toward the center, it increases. The entire field is defined by the Sun, and shaped by the Sun, so the radial lines of the main field come out from the Sun. If that is true, then the field lines get closer together as you get nearer the Sun. When field lines get closer together, the field gains density. Therefore, the effects of outer planets on inner planets are relatively greater than the effects of inner planets on outer ones. One way to look at this is to recognize that inner planets are emitting out into larger shells. The surface area and volume of these shells increases with increasing distance from the Sun, so the charge field loses density for that reason. But in the reverse case, the charge field density must increase, because the outer planets, when perturbing inner planets, are emitting into a smaller orbits and smaller shells.

You will say, "But the Solar System is not enclosed. What keeps emission from outer planets from escaping into space?" When the emission is away from the Sun, very little. The Sun's charge field lines can only channel it, but they cannot keep it from traveling out into space, since that is where it is going regardless. But when the emission is traveling toward the Sun, the Sun's field lines channel all charge toward the Sun. The charge field out from the Sun is constant and relatively heavy, so it is a pre-existing stream that any new emission must be affected by. Some emission from outer planets to inner ones will be lost to space, but the bulk of it joins the stream, and is channeled into ever denser fields, until it perturbs an inner body or is recycled through the Sun's poles. To read more on this, consult my recent equations on the magnetosphere http://milesmathis.com/pause.html.

Now you will say, "But you didn't square or quadruple your effect. If the density increases as we go in, shouldn't it follow a square law, at least? How can you just multiply by 23?" Once again, you can't just follow equations, you have to follow mechanics. Yes, the charge field will square because we are going to smaller surface areas, but we are still in the gravity field, too. We are in both simultaneously: the unified field. You can't go toward or away from a gravity field, in this case. You are either in one or you are not. Gravity is still the inverse square (relative to the charge field), and the charge field is now squared, since we are moving in. So the two together cancel, giving us a field that simply increases with distance. If we follow the charge field out from the Sun, we use $1/R^4$. If we follow the charge field in, we use $1/R$. I will solve another pair of perturbations, to show this in more detail.

Let us study the opposite effect from Mercury, on the planet Uranus. Mercury is perturbed from one side, and has very little tilt. Uranus is perturbed equally on both sides, and has a lot. First of all, Uranus is the only planet, save Mars, that has planets larger than itself on both sides. This is important. Even more important is how the size and distance of these planets create a balanced field. Uranus has a tilt of about 97^o, or about seven degrees from flat, so we would expect fairly balanced fields on both sides of Uranus. This makes Uranus 8% away from balanced. Saturn has a charge field that is 2.33 times as dense as Neptune's (charge density differential = mass differential x density differential) and is .8107 as far away. This gives Saturn a relative charge density of $2.33^{1/4} = 1.2335$. Neptune's is 1/.8107 = 1.2335. The difference between them is 0%.

The first bomb has just dropped. Check your pulse. If not for further perturbations, Uranus would be completely inclined to 90^o.

We don't get the 8% we were looking for, so we have to look at Jupiter. Jupiter's charge density is 6.46 times that of Saturn and is 1.5 times as far away, so if Saturn's effect at Uranus is 1.2335, Jupiter's will be 1.276. That appears to be too much extra perturbation, but we must remember that Jupiter spends a large part of its charge perturbing Saturn. Charge is a real force transmitted by real particles, so once it is spent it is spent. It cannot be used twice. So we have to calculate how much charge Jupiter spends perturbing Saturn. Saturn is twice as close to Jupiter as Uranus is, so Jupiter must perturb Saturn 16 times as much as it perturbs Uranus. This takes Jupiter's relative perturbation on Uranus down to .08, which is about 6.5% of Saturn's effect on Uranus. We are quickly closing in on that 8% variance. I would assume the rest of the variance is from the Sun. Rather than fine-tune the math further, let us move to a third example, to be absolutely sure we are on the right track.*

Let us now look at the Earth. You can immediately see that the Earth is flanked by planets that are neither close to even nor vastly different. So, given the general theory, we wouldn't expect zero tilt and we wouldn't expect a 90^o tilt. Let us calculate the actual tilt, straight from the perturbations. Venus and Mars offset, since their perturbations are nearly equal. Venus has ten times the charge density of Mars, but Mars is 1.88 times further away. So if Venus' number is 1.78, Mars' is 1.88. They offset eachother, but play no role in the other perturbations, since they are swamped by the charge fields from the Sun and the Jovians.

Jupiter has a charge density of 1/1117 that of the Sun and is 4.22 times further away. So if the Sun's relative charge density at the Earth is 5.78, Jupiter's is 4.22. That is a 15.6% variance, or 14^o.

Saturn has a charge density of 1/7210 that of the Sun and is 8.61 times further away. So if the Sun's relative charge density at the Earth is 9.21, Saturn's is 8.61. That is a 3.39% variance. But we don't add that directly to Jupiter's angle. We have to apply that variance to the remaining angle of 76^o, giving us an extra angle of 2.58^o.

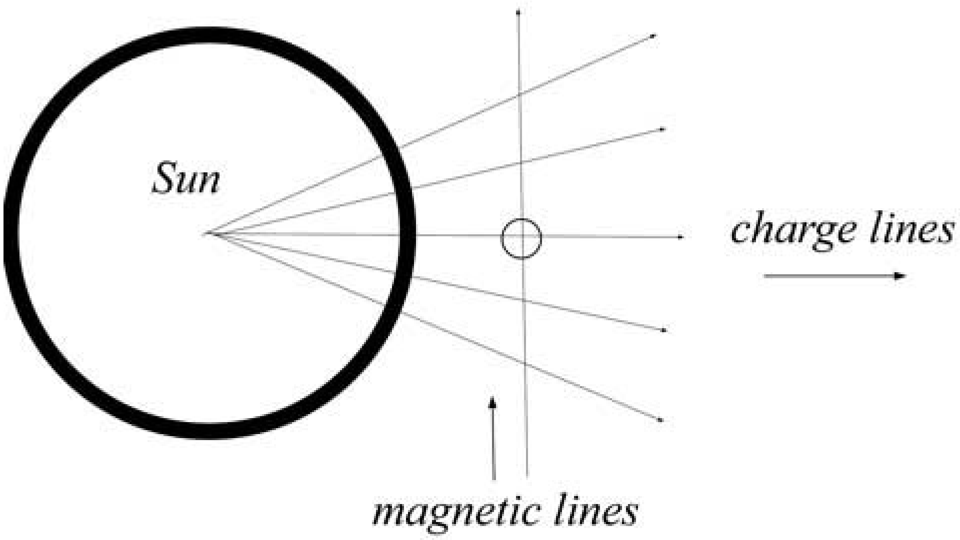
Uranus has a charge density of 1/25,600 that of the Sun and is 17.45 times further away. So if the Sun's relative charge density at the Earth is 12.65, Uranus' is 17.45. That is a 15.95% variance. The remaining angle is 73.42^o, so 15.95% of $73.42^o = 11.71^o$.

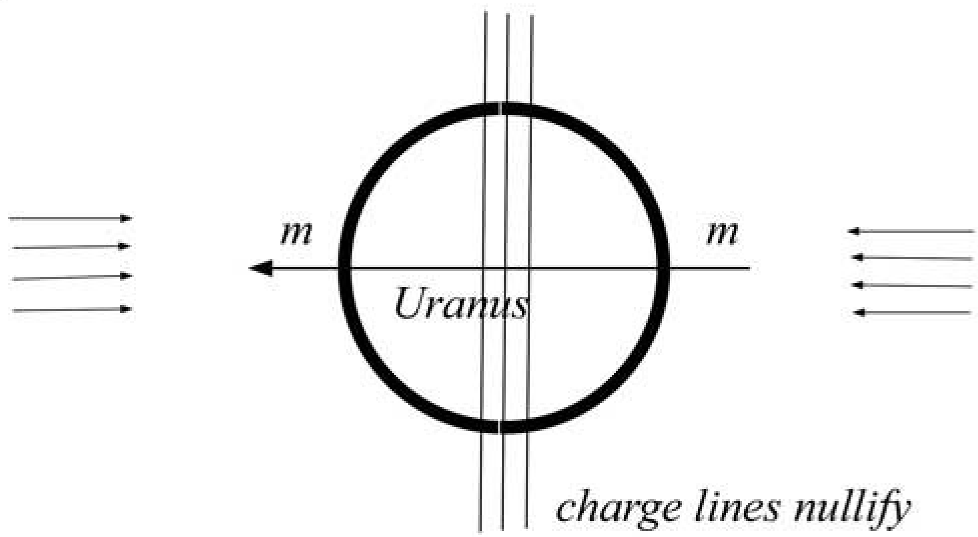
Neptune has a charge density of 1/16,800 that of the Sun and is 28.3 times further away. So if the Sun's relative charge density at the Earth is 11.4, Neptune's is 28.3. That is a 42.57% variance. The remaining angle is 61.71^o, so 42.57% of $61.71^o = 26.27^o$.

Pluto has a charge density 1/10,760,000 that of the Sun and is 37.7 times further away. So if the Sun's number is 57, Pluto's number is 37.7. That is a 20.4% variance. The remaining angle is 35.4^o, so 20.4% of $35.4^o = 7.08^o$.

The remaining angle is 28.32^o. You can see that we are closing in on our known angle of 23.4^o. I won't continue adding and subtracting influences, since I have shown the method already (and it gets very difficult after this). I got more rigorous with each example in this paper, going from a rough suggestion with Mercury to a fuller list of influences with the Earth. I will do some more math in part 2 of this paper, as well answer some broad questions. And in upcoming papers I will try to do these calculations with absolute numbers, rather than relative numbers.

I have shown enough math and examples to strongly suggest my postulate is correct. Now let me tell you why it works. If the planet has no tilt, the charge field is coming from one direction. If it is fully inclined, like Uranus, the charge field is coming from both directions evenly. Let us look at Mercury first. The charge field of the Sun http://milesmathis.com/pause.html is moving mainly radially past Mercury, since it a simple emission field from the Sun, heaviest at the equator. The magnetic field is orthogonal to both the charge field and the electric field (due to the spin on the photons), and Mercury aligns itself to the magnetic field. Which is why Mercury is nearly straight up.





But a charge field coming from opposite directions evenly, as with Uranus, becomes a sort of balanced dipole. Although the charge field is the foundational field underneath electricity and magnetism, and is normally not a dipole (meaning, it is a straight bombarding field, or emission field, at the basic level, as emitted by spheres), in cases like this it does take on a dipole configuration, since we have bombarding and perturbations going in two opposite directions. The charge field is interpenetrable to itself, for the most part, so we can have charge or photon traffic going both ways in the field. When the charge field is balanced like this, it creates a sort of zero sum at the distance of balance. The field lines cancel eachother, and if we draw them, they no longer have any summed strength in the radial direction (toward and away from the Sun). Instead, we would draw them as null, going perpendicular to the Sun. Since the magnetic field is always perpendicular to the charge field and the electric field, and since it is the magnetic field that guides the axes, the axes will line up with the perturbing bodies in this case.

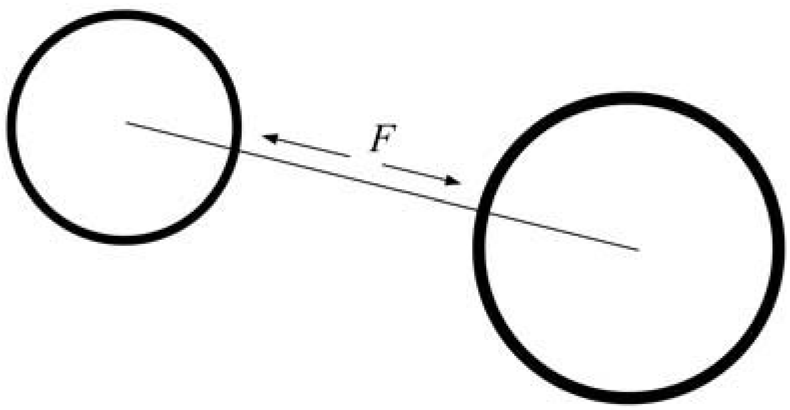
Of course this illustration is just a rough visual suggestion, but I think it simplifies the mechanics into a comprehensible form. I could have also illustrated this with potentials and pluses and minuses, but I have developed a distaste for pluses and minuses. What I have here is enough to begin the revolution.

A doubter will say, "What makes you think this effect comes from the charge field? You used mass and density to get your numbers, and we could just as easily give those to the gravitational field." First of all, balanced perturbations from two opposite directions would not cause a force in the gravity field. I have shown equal perturbations upon Uranus from Neptune and Saturn. How could the gravity field cause a turn? Gravity would have to effect the two poles differently. We can see immediately how charge would effect the two poles differently, but not gravity. Second, why would you multiply mass and density in the gravity field? That gives you D^2/V. There is no possible reason you would square the density of a given object, and then use that number in the gravity field. But with the charge field it makes perfect sense. As I have shown http://milesmathis.com/charge.html, mass and charge reduce to the same dimensions. The statcoulomb reduces to mass, and the Coulomb reduces to mass/second. So if we seek a charge density, we seek a mass density. Third, the gravity field would not change as I have shown the charge field changes, as we toward or away from the Sun. The gravity field never changes at $1/R^4$ or 1/R, but I have shown the simple mechanical reason the charge field does so.

Conclusion: I have just shown, with simple equations, that it is quite easy to explain axial tilt with unified field perturbations. In fact, the perturbations themselves are strictly charge perturbations, and I call them unified field perturbations only because they take place in a gravity field. To repeat what I have said in many papers, my unified field IS Newton's gravity field. I have pulled apart Newton's famous gravitational equation http://milesmathis.com/g.html> and found the charge field already inside it. G is transform between the two fields that have always been inside Newton's equation. So all these corrections I am making can be made INSIDE the existing equations. I am not adding a field to existing equations, I am showing the fields that were already there all along. This answers the replies from the mainstream, for a century, that there was no room for corrections. There is very little room outside the mainstream or historical equations, it is true, but there is a lot of room inside them for corrections. The charge field is inside the existing equations, and it had to be to make them work mechanically. Celestial mechanics could not work like it does, with resonances and perturbations and so on, if it were a single field. This should have been clear to Kepler and Newton and Laplace and everyone else, but they preferred to look away.

Now, this is just the beginning, it is true. I have been forced to use relative math here, meaning my numbers are one body relative to another. I haven't yet been able to develop all the equations I need to find numbers straight from the bodies' masses. Therefore I can't yet publish a full set of equations to replace those of Laplace. As you can see by my method here, I *could* publish a full set of equations of relative numbers, using the simple equations above. All I would have to do is keep calculating perturbations from other bodies, until I had a full set. Given the number of bodies in the Solar System, that would be a large set, but it could be done by computers. However, I prefer to wait until I have the straight equations. These will be more useful and transparent to current physicists, who aren't used to dealing with the sort of simple, relative math I am doing here.

However, I think I have proved my point, made in my paper on Laplace http://milesmathis.com/laplace.html, that the perturbations should and can be calculated from masses and distances, without having to write equations for curves or ellipses. What solves the original problem of Euler, Lagrange, Laplace, and the rest, is not looking at the “remaining inequalities,” it is correcting the mechanics underneath the fundamental equations. Once we do this, the errors are removed by straightforward means, not by plying them with differential equations and power series and other tricks. The same can be said for Einstein's equations. We don't need non-Euclidean math to solve this, since in perturbations the charge field is moving in straight lines from one body to the other. Light may or may not curve when passing large bodies, depending on what background you choose, but we don't have to imagine the charge field looping around large bodies in this problem. The charge photons can go the shortest possible path in perturbation problems, and that path can be defined as straight. What I mean by that can be seen by looking at a simple illustration.



Although the space may be curved around two bodies (if we want to do math the way Einstein did it), even then the line between the two bodies cannot be made to curve. Non-Euclidean math doesn't make that straight line a curve. Einstein's field equations don't curve that line. That is the natural line of perturbation, therefore curved math is superfluous. We can proceed without it. That is precisely why Newton's equation usually got the right answer: even in a curved field, his line of influence is uncurved. Non-Euclidean math doesn't curve Newton's line of influence, it only adds Relativity or time separation to the field. Besides that, I have already proved in other papers that you can add Relativity to gravity without any curves. A Euclidean math has always been available http://milesmathis.com/easy.html to express GR without curves.

Using my new perturbations, I will eventually be able to dissolve most of the “inequalities” that remained even after Laplace did his work. This means that I will also be able to dissolve much of the “indeterminism” in chaos theory. The Solar System must be less chaotic once the equations are corrected. Beyond that, I will destroy the fundamental assumption and presumption of chaos theory, which relies on the previous perfection of the equations of celestial mechanics. The universe can only be chaotic if our equations are perfect. If our old equations were chaotic, then the universe returns to an unknown, neither chaotic nor non-chaotic.

See part 2 of Axial Tilt http://milesmathis.com/tilt2.html for further clarifications and equations, including comments on how this solves nutation.

*This calculation of Jupiter's variance on Uranus is very rough, since it doesn't take into account all the factors. It is meant only as a suggestion.
