Re: Is magnitude more fundamental than the real numbers?

Source: http://sci.tech−archive.net/Archive/sci.math/2006−08/msg00392.html

- *From*: "Timothy Golden BandTechnology.com" <tttpppggg@xxxxxxxxx>
- *Date*: 9 Aug 2006 04:43:19 −0700

Dik T. Winter wrote:

> In article <1155061899.245391.199990@xxxxxxxxxxxxxxxxxxxxxxxxxxxx> "Timothy Golden BandTechnology.com" <tttpppggg@xxxxxxxxx> writes:
> \> Dik T. Winter wrote:
> ...
> \> > The "identity axis" is nothing new at all. It is well known that when
> \> > you multiply a number by a zero divisor that the result is a zero
> \> > divisor. And that is what your "identity axis" states, the only point
> \> > is that there is not a single "identity axis", there are multiple.
> ...
> \> There is only one of these axes. It acts like a real line embedded in
> \> the even signed P4+ domains. It always has the notation (1, 0, 1, 0,
> \> ...).
>
> No, there are more of them.
>
> \> The term 'zero divisor' is one that I am not yet comfortable with, but
> \> it is fairly easy to see that in the reals
> \> (0) (+5) = 0 .
>
> Yup. But a zero−divisor is a *non−zero* number that can be multiplied by another non−zero number to give 0. So when a and b are non−zero and a.b = 0, a and b are both zero divisors.
>
> \> This does not make any strong statement about the number +5, just as
> \> the example in P4
> \> (# 1 + 1) (# 1 * 1) = 0 .
> \> does not make a strong statement about (# 1 * 1).
>
> But (#1 + 1) is non−zero, so it makes a strong statement. Anyhow, you will not find a solution to:
> (#1 *1 +1)/(#1 *1)
> because the first is not a zero−divisor and the second is.
>
> In P4 there are numerous zero−divisors, some basic ones are the following six (coordinates in order #, *, +, −):

(1, 1, 0, 0) (1, 0, 1, 0) (1, 0, 0, 1) (0, 1, 1, 0) (0, 1, 0, 1) (0, 0, 1, 1)
for *all* six of them you can not find a quotient if you try to divide
(1, 1, 1, 0) by any one of them.

> Also, you've neglected the tail portion of my statement that makes a
> fairly strong argument, particularly the analysis of
> z (# 1 + 1) = c
> for constant c. There is perhaps a misunderstanding.

But z (1, 1, 0, 0) is also on some axis (a different one).
Some linear algebra: to solve
(a1, a2, a3, a4)/(b1, b2, b3, b4) = (p1, p2, p3, p4)
you get at the matrix
(b1 b2 b3 b4)
(b4 b1 b2 b3)
(b3 b4 b1 b2)
(b2 b3 b4 b1)
we are interested in the determinant, because if it is zero there is in
general no solution. The determinant is zero if either b1+b2+b3+b4 = 0
or b1−b2+b3−b4 = 0. It is however a bit more tricky as we are in
equivalence classes where incrementing each coordinate by the same value
does not change the number: (1, 1, 1, 1) = 0. But whatever increment
we use, the determinant remains zero if b1−b2+b3−b4 = 0. So we can never
find a generic solution for (1, 1, 0, 0), (0, 1, 1, 0), (0, 0, 1, 1) and
(1, 0, 0, 1) (or in general for (b1, b2, b3, b4) if b1−b2+b3−b4 = 0).
And, indeed, if b1−b2+b3=b4 = 0, (b1, b2, b3, b4) is a zero−divisor.
In that case: (b1,b2,b3,b4)(1,0,1,0) = (b1,b2,b3,b4)(0,1,0,1) = 0.
You are only seeing that (1, 0, 1, 0) and (0, 1, 0, 1) can only divide
(a1, a2, a3, a4) if a1 = a3 and a2 = a4.

> The identity axis is a dominant feature of the even signs. as is
> demonstrated by

Sorry those pictures do not tell me anything.

> Is this perhaps a counterexample to your claims above?:
> (# 1 + 1)(# 1 + 1) = # 2 + 2 ;

I see no counterexamples. Try to divide (1, 1, 1, 0) by (5, 3, 1, 3) and
see that it fails. More knowledge about zero−divisors would help you.
−−
dik t. winter, cwi, kruislaan 413, 1098 sj amsterdam, nederland, +31205924131
home: bovenover 215, 1025 jn amsterdam, nederland; http://www.cwi.nl/~dik/

Hi Dik.

I believe that I have resolved our apparent disagreement. I've
scrambled together a low grade reciprocal finder (results with large
error) and sure enough the divisor counterexamples that you provide
have no decent reciprocal. I've read the definition of zero divisor and

it is fine though it does not discuss anything about the underlying structure of the system it is applied to. I suppose that is up to us and I am now curious what we'll see above p4 in this context.

The 'other axes' are actually a plane. It is the plane that is perpendicular to the identity axis that passes through the origin. We've discussed it a bit before but now I can see it in the context of division. Just as a multiplication by a point on the identity axis removes information so does a multiplication by any point in this plane. Instead of squashing the information into a line it yields two dimensions of result, but still provides an irreversible effect on any object. In effect the object has been squashed into a plane and can never be 'unsquashed' informationally. This is exposed in

http://bandtechnology.com/PolySigned/Deformation/AxisDualDeformStudy.gif
When the sphere crosses over itself (flipping handedness) this is the place.
This is a product view which explains why the division will not yield results since the quotient is the reversal of the product. We cannot get three dimensions back from two. There must be a theorem on dimensional reduction and zero divisors. It's clear in the informational context.
Because of this dimensional behavior the only meaningful division on the zero divisor parts are more values from those parts. The zero product is composed of one value from each of these parts, those parts being the identity axis and the plane orthogonal to it on the origin. There should be a theorem there as well. Upon excluding this plane as well as the line that I call the identity axis we can have division.

This is quite a structure built in isn't it? The line literally combined with the plane. Very pretty.
Physics could be here, and in a dimensionally consequential way.
I suppose you are nearing an R x C style equivalent definition of the P4 product. As I scramble to follow along now I am wondering what you will find next. And what of P6? Is the zero divisor exclusion the identity axis and the points orthogonal to it through the origin? What is a plane in P4 would be a 4D space in P6. This would be a (1, n−1) type of relation. That is consistent with the zero products, whose possibility space rises dimensionally.

If the Hopf, Milnor and Kervaire dimensional theorems apply then we should be able to get a zero divisor structure in P7 as well. But they suggest that P5 will work perfectly. I'll have a better reciprocal finder eventually. For now it is slow but could find reciprocals up in these spaces. If you want me to look for something specific I'll be happy to try.

I'm not very good at linear algebra but I'll try to follow along. So far I don't see how you got the matrix in b. Is this a conjugation style of division? It should be possible to specify a conjugate in P4 so long as we are off of the zero divisor structure but I don't have it.

−Tim

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