Re: Polysign Quotients

Source: http://sci.tech−archive.net/Archive/sci.math/2006−08/msg01031.html

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- *Date*: 14 Aug 2006 07:34:39 −0700

Mariano Suárez−Alvarez wrote:

> Timothy Golden BandTechnology.com wrote:
>
> > Mariano Suárez−Alvarez wrote:

snip

> > > You will not find an exception to a theorem.
> > >
> > > > [snip]
> > > >
> > > > I still have not found the Hopf proof. Since
> > > > you have carefully noted
> > > > its publication I'll see what can be gotten in
> > > > english.
> > >
> > > You can look for similar arguments in Husemoller's "Fiber
> > > Bundles",
> > > if I recall c0orrectly.
> > >
> > > Hopf's theorem, as well as Milnor−Kervaire's and others in
> > > this
> > > direction are *not* proved using algebra, but algebraic
> > > topology.
> > > The topological arguments stem from a rather deep study of
> > > what spheres can be given the structure of H−spaces (see
> > > wikipedia por a definition) and similar ideas.
> > >
> > > −− m
> >
> > The polysign numbers are a new construction so there is a sliver of a
> > chance that they could defy some of existing mathematics.

Again, you will not defy existing mathematics.

> I'm hunting
> for P5 zero divisors now. It looks like they are there, but I have yet
> to get all the way to zero. For instance
>
> (1.077, 0.889, 0.228, 0, 0.519) * (1.004, 0.420, 0.371, 1.043, 0)
> = (0.005, 0.005, 0.011, 0.016, 0)
>
> and whose magnitude is 0.014 . (These values are chopped, not rounded)
> A perturbative algorithm on these unity magnitude operands should get
> a zero value, and expose the structure that these zero divisors are on.

Pick n >= 4.
Write e_i for the i−th "sign" in your n−polysigned numbers. Let

x = sum_{k=0..n−1} cos(2 pi k / n) e_i

and

y = sum_{k=0..n−1} cos(4 pi k / n) e_i

(If you do not like negative coefficients, just add a large
enough multiple of

sum_{i=0..n−1} e_i

so that all coefficients become positive; this does not
change the end value...)

Then a little trigonometry should convince you that

x y = 0.

NB: You may enjoy computing the product for 1 <= n < 4, and
what is different in those three cases.

Note that I did not come up with the this example out of
thin air: this is just a particular instance of a rather more
general phenomenon, studied (essentially completely and
exhaustively) by Frobenius, Schur, Wedderburn and others
nearly two centuries ago.

Neat. I've verified it for P4 thru P9. I don't understand it.

> > The zero divisors are still a coherent part of a continuous mapping.
> > I'm not sure in strict math what the proper teminology is, but right
> > nearby the zero divisors are points just off of zero, so in this way
> > the whole 'division algebra' problem makes me ask the question 'so
> > what?' What is it that we are gaining by studying the division problem?
>
> Well, for one thing, you are studying the division problem.
>
> > We can express general dimensional relations such as
> > 0 = a0 + a1 z + a2 z z + a3 z z z ...
> > but where will the division algebra become consequential?
>
> It really depends on what you want to do. You have to
> decide what you want to use your polysigned numbers
> for, and then evaluate if for *that* purpose the fact that
> divisors of zero exist for almost all cases is consequential
> or not.
>
> > I understand
> > that it helps characterize a construction, but I'm wondering where it
> > goes from there?
>
> I would heartily recomend that you try to go through an
> introduction to the theory of algebras, such as Pierce's
> `Associatve Algebras'.
>
> −− m

Alright. Thanks for the reference. I'll try to get to it.

What do you think of P1?
The polysign construction does not require the usage of
Sum(sx) = 0
except for purposes of graphing or 'rendering' a result.
In this sense the components are accumulators.
Zero−dimensional(P1) operations work but always render to zero.
There is congruence with time.

In some regard this 'disappearance' is what we are seeing in P4+
through zero divisors.
Dimensions are disappearing. Physics has an accepted 'tunneling' effect
modelled by energy wells. Perhaps there is a linkage to the
arithmetical behavior of polysign numbers in the higher signs.

Do you believe there is a way to express the equivalent of an

exponential for Pn?
Even in P3 the closest that I have gotten yet is just to take a value near unity and take the series z^n. A clean value will iterate a circle. I've tried this for values in higher signs but the results become degenerate. Now I am wondering if I simply haven't chosen the correct initial value; For instance in P4 the correct choice may be just off the unity vector along +1#1.
Can I trace out a unit shell in any dimension via z^n? I'm fairly certain that the answer is no simply due to magnitude nonconservation in P4+ products. Whether that would break an exponential definition I am unsure.

−Tim

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