ZULF'S FEBRUARY 13 2022 TOTALLY ELEMENTARY ISSUES FOR DISTRIBUTION THEORY AND FOUR-SPHERE

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1. Issues With No Mathematical Challenge

I have an interest in having some sharp development of analysis and distribution theory for the four-sphere S^4. I just want to go through issues of notation without mathematical substance because sometimes this is simple and easy and requires no strenuous effort. I am following Friedlander-Joshi's Cambridge course book on distribution theory. I hate reading the 'notations' section of all mathematics books because it is like reading the phone book and mildly less exciting than reading UNIX man-pages.

Let $X \subset \mathbf{R}^n$ be an open set. Then $C^k(X)$ for $k \geq 0$ integers are functions with all derivatives of order less than or equal to k being continuous. The support of a function f is *the closure of* $\mathrm{supp} f = \{x \in X : f(x) \neq 0\}$ and is always a closed set. The notation $C_c^k(X)$ and and $C_c^\infty(X)$ is used for functions with compact support.

In distribution theory test functions are $C_c^\infty(X) = \mathcal{D}(X)$.

This is good. Now let's do some elementary things to handle S^4 for analysis. In analysis texts usually these elementary issues are not made plain. Let's do this for smooth and C^k manifolds generally. The notion is relatively new, going back to Hermann Weyl's *Concept Of a Riemann Surface* in 1926 I believe.

Suppose M is a topological space with a chart (U_a, ϕ_a) where $\phi_a : U_a \to \mathbf{R}^n$ are homeomorphisms. One does 'calculus' on manifolds based on derivative operations on 'transition functions'

$$\phi_b \circ \phi_a^{-1} : V_a \to V_b$$

where $V_b = \phi_a(U_a)$. The idea is simple enough, that you have some way of getting some functions that are just maps from open sets of $\mathbf{R}^n$ to other open sets in $\mathbf{R}^n$ and then ordinary multivariable calculus of these functions can be considered as 'calculus on M'. This scheme had shown effectiveness for geometry and topology of manifolds, and so people use it.

Now I will confess, traversing back in memory lane, to 1991, I was quite familiar with this scheme then, and I had learned the handwaving of 'now that we have something or other $\mathbf{R}^n \to \mathbf{R}^n$ it is now in the realm of analysis. And then I would make this hand gesture.

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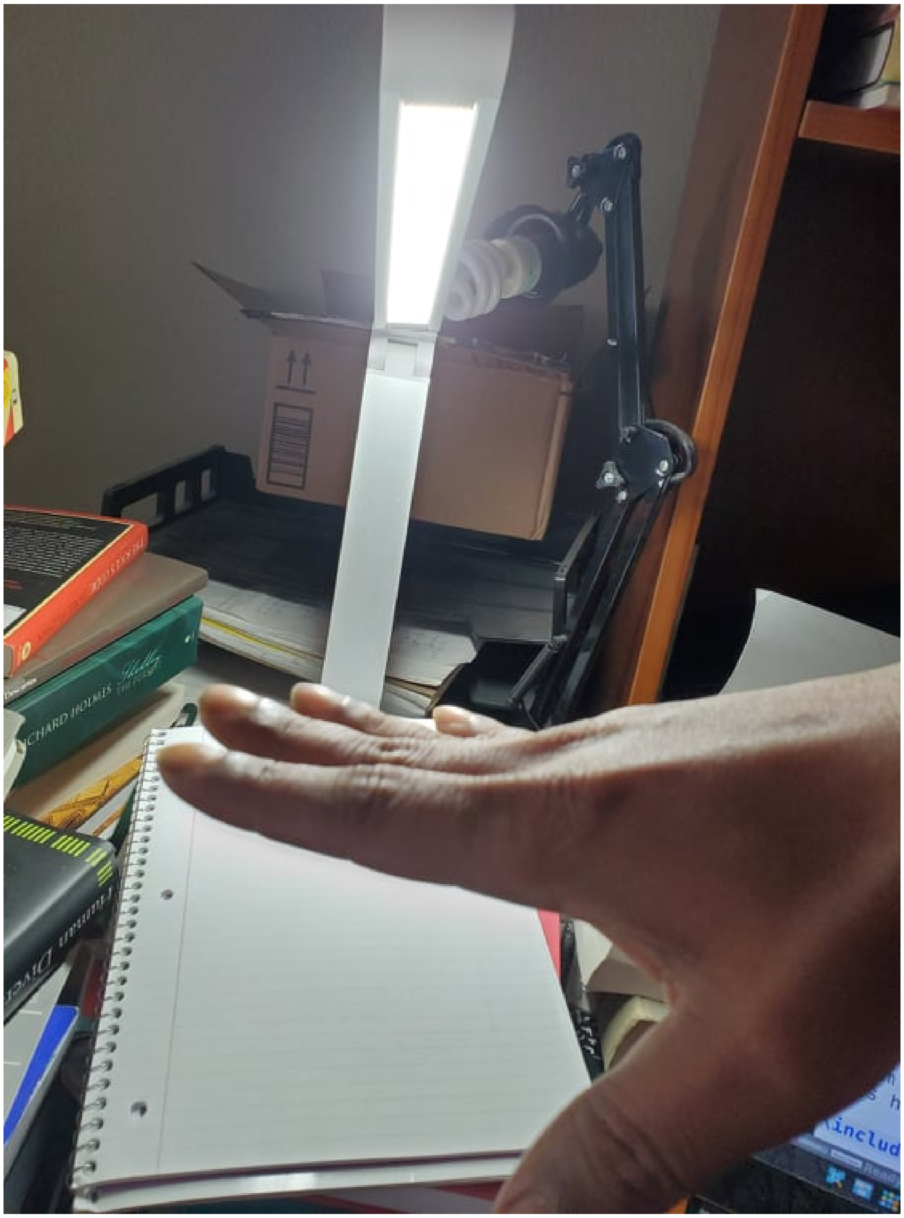

The gesture would indicate that the matter was *merely local*, and once the matter was local, of analysis on $\mathbf{R}^n$ it would be the realm of these hardworking *analysts* who we then thought of as the sorts of industrious people who would prove all sorts of things that we could use in the more airy higher realm for proving more grand and beautiful things giving them a pat in the back or something to keep them happy.

2. How Misfortune Struck The Privileged

The privileges of geometric and topological mindset, where all sorts of labourious gruntwork would be done by these *analysts* while we proved more grand and airy and fundamentally more important things on their back-breaking toil, would not last forever for Zulf. For one thing, it turned out that the geometry of absolute space, S^4 had nowhere else to go but back to analysis because all sorts of theorems already existed about how there is not much going on topologically. You have $H^*(S^4)$ totally empty of any interesting feature. Of course if $H^2(M)$ has a lot of algebraic structure you can do all sorts of calculations and tell these analysts that they wouldn't understand these things they are not trivial and local enough. But alas that was not meant to be.

I have to swallow my pride, give up all clever ideas of making these *analysts* do all the work and do some work myself. And that is really one of the major themes in the *Life And Times Of Zulfikar Moinuddin Ahmed*, that late in life, he did have to just do some analysis and it was foolish to try to avoid it for *years*.

3. There Are No Non-Equivalent Spin Structures On Four-Spheres

All the hard work to classify non-equivalent spin structures on various topological manifolds is simple for S^4. There is nothing in $H^2(S^4)$ so the spin structure is unique. Now for topologically-minded people this is boring. But I was wise already in 2008. I realised that this is one of the best features of four-sphere, because it implied *mathematical physics* will be simpler, for four-sphere and none of the Euclidean spaces $\mathbf{R}^n$ is the geometry of absolute space. There are very few things more deeply satisfying than to understand clearly that ever since spin was discovered in Nature, this feature of absolute space, that four-sphere has no obstruction to lifting the principal $SO(4)$-bundle of orthonormal frames to a $Spin(4)$ bundle implies that *Spin in Nature* is literally canonical in absolute space. Suddenly it flashed in my mind in 2008 already that these algebraic topological works, Stiefel-Whitney Characteristic classes and such lead us to a clearer understanding of actual nature! Nature has no strange ambiguity at all about Spin structures. *And it is the natural spin structure* that is the feature that had been attributed in all these obsolete and wrong physics theories as some internal dimension of particles. Particles do not have the intrinsic spin but absolute space does and particles are just spinor fields. The geometry of absolute space determines physics of the objective world to such an extent that all previous efforts of Man to theorise about particles in 'free space' had been misguided for centuries. There is no $\mathbf{R}^3$ anywhere but in our imagination, for particles are simply due to zonal spherical harmonics appearing in spinor fields that are eigenspinors of the Dirac operator on ΣS^4. This insight would take me a decade of effort to sharpen and articulate. The behaviour of particles in nature is strongly determined by four-sphere geometry of absolute space. There was never any 'big bang' and there is no 'expansion' in the actual universe. There is no 'time dilation' and there is no 'gravity' at all. All of Nature is a fixed geometry

$$S^4(R) \times \mathbf{R}$$

with no relation between space and time, and the surface of $S^4(R)$ is the right notion of *aether* which allows classical wave propagation, and James Clerk Maxwell was wrong about his particular notion of luminiferous aether, but the idea that there is a medium for wave propagation was in fact right and the conclusions of Michelson-Morley experiments were wrong in the sense that they had not falsified aether in general but only three-dimensional aether. In fact it is *all aether*, and the entire universe is a vibrating membrane with perfect homogeneous geometry and all matter and energy in it is government by geometry of an eternal static four-sphere.

4. Regularisation Of Functions

Theorem 1. *Let $f \in C_c^k(\mathbf{R}^n)$ with $k \geq 0$. Let $\rho \in C_c^\infty(\mathbf{R}^n)$ with*

$$\operatorname{supp}(\rho) \subset B(0,1)$$

and $\int \rho = 1$. For $\epsilon > 0$ define

$$f_\epsilon(x) = \int f(y)\rho(\frac{x-y}{\epsilon})dy.$$

Then $f \in C_c^\infty(\mathbf{R}^n)$

and support of f_ϵ is within an ϵ-neighborhood of the support of f. And for $|\alpha| \leq k$ we have $\partial^\alpha f_\epsilon$ converging uniformly to f.

This is easy to prove and is absolutely beautiful. This Friedlander-Joshi's Theorem 1.2.1. The reason I love it is that it's true and it's a solid articulation of something that is otherwise an intuitive mess for me. Now I can just invoke Theorem 1.2.1 of Friedlander-Joshi and instantaneously get all sorts of smooth compactly supported approximations of any $C_c^k(X)$ function without doing any additional work. I won't go through the proof and take a look at how I can use it.

Suppose I am given a function $f \in C^k(\Omega)$ with $\Omega \subset S^4$ then how will I analyse it? Suppose Ω is open. If $\Omega \neq S^4$ I can pick a north pole p_n for S^4 and use stereographic projection $\sigma : S^4 - p_n \to \mathbf{R}^n$, so that σ is homeomorphism of Ω, and then consider the function

$$g = \sigma^{-1}(f(x))$$

on $\sigma(\Omega)$ and apply Friedlander-Joshi Theorem 1.2.1 to get approximations g_ϵ of $g \cdot A$ where A is a cutoff function and voila I have totally $C_c^\infty(\sigma(\Omega))$ functions that approximate $g \cdot A$ along with all the derivatives uniformly without doing any work.

See that's what I love about labeling some of these simple constructions and theorems, because quite honestly that's more annoying than proving them. I want some of these very useful things labeled better so I do much less work. People have not been doing that. These are the sorts of useful things that these hard-working analysts have been doing for centuries. We don't want to re-invent the wheel but just wave our hands and invoke that by the decree of such and such and in the name of the Viceroy of Habijabi and so on that we can magically produce these smooth approximants g_ϵ. This I love. Someone should name them something easy to remember so that the backbreaking labours of these analysts can provide luxury for everyone.

What I really hate is that some of these constructions in analysis are continuously re-worked mostly because they don't have a good name. Why do people have to rework these approximations over and over again? In Stanford Mathematics Ph.D. Qual Exams we should just be able to invoke them with reference to a good *name*. Mathematicians are extremely bad at organising useful things. See Software Engineers are better at this. They put things in some standard library and just invoke totally elementary operations like 'atoi' and such with including a standard library in the header. But Mathematicians would laboriously re-construct the machine code low-level bits and pieces all the time just because they didn't name something with a memorable thing, like *Lebesgue's Dominated Convergence*

Theorem. Or *Banach-Steinhaus Theorem*. So what you have is a huge amount replication of this sort of totally elementary constructions. If you pooled together all the mathematicians who have re-proved elementary results instead of doing something productive with their lives you will die from the sadness and pity at the unfortunate ways that lives had been expended all because Mathematicians were not organised in naming things.

5. Distributions

Let $X \subset \mathbf{R}^n$ is an open set. A linear form $u : C_c^\infty(X) \to \mathbf{C}$ is called a distribution if for every compact set $K \subset X$ there is a $C > 0$ and nonnegative integer N such that

$$|\langle u, \varphi\rangle| \leq C \sum_{|\alpha|\leq N} \sup |\partial^\alpha \varphi|$$

for all $\varphi \in C_c^\infty(X)$ with $\mathrm{supp}(\varphi) \subset K$. The vector space of distributions is called $\mathcal{D}'(X)$.

This is the precise definition of distributions and it is worthwhile to just do some minor window dressing from this to produce a precise formulation on distributions on S^4, without intention of proving any mathematical results at all.

Suppose $\Omega \subset S^4$ is an open set and $\Omega \neq S^4$. Then we can choose a fixed north pole $p_n \in S^4$ with $p_n \notin \Omega$ and identify Ω with $\sigma(\Omega) \subset \mathbf{R}$. Then we define distributions on $\Omega \subset S^4$ by the above definition by the well-defined

$$\mathcal{D}'(\sigma(\Omega))$$

which is covered by Friedlander-Joshi's definition. Note that it's fine to use the same constants $C > 0$ for distributions and ∂^α are just ordinary derivatives in $\sigma(\Omega) \subset \mathbf{R}^4$ and there is nothing special locally for distributions on S^4 at all.

The fact that distributions for $\Omega \subset S^4$ are literally just distributions on $\sigma(\Omega)$ is a huge relief for me, and would be psychologically satisfying to almost everyone who gets involved. I have just used the stereographic projection and I don't use the Levi-Civita connection and other paraphenalia at all which always brings in consternation. analysis of distributions of $\sigma(\Omega)$ is just using ordinary derivatives. That's really nice because that's one way for me to talk about distributions on the four-sphere immediately without doing all manner of messy technicalities.

Now you will need some nontrivial work from Christian Bär to work with distributional spinor fields. The main issue is that there is a trivialisation of ΣS^4 by Killing spinor fields $\sigma_1, \dots, \sigma_{16}$, and then it is convenient to just write

$$s = f_1\sigma_1 + \cdots f_{16}\sigma_{16}$$

for arbitrary functions $f_1, \dots, f_{16}$ and you can make them Lebesgue measurable functions or you can make them distributions and they are instantaneously well-defined and you can do your analysis just on $\sigma(\Omega) \subset \mathbf{R}^4$ for various nitty gritty analysis and claim knowledge of *distributional spinor fields* as a result.

I want to point out something quite simple. How much simpler is this entire infrastructure than *quantum fields*? This is pure good well-defined mathematics and you can prove, especially if you are one of these industrious hard-working analysts, all manner of useful results for these things so that great men like myself can use them to become famous and immortal for saying 'such and such a thing which is proven by this fabulous industrious gentleman so and so allows me to conclude these great things about Nature'.

6. The Great Journey Ends From Newton And Leibniz To Mathematical Setting For Physics

It was in the 1660s that Isaac Newton and Gottfried Leibniz began their first invention of the calculus, and over time these developed and completed with Henri Lebesgue's measure and integration theory and Sergei Sobolev and Laurent Schwartz distribution theory. In the paragraphs above you have the analytic infrastructure prepared for all mathematical physics above $\delta = 10^{-15}$ cm.

It's not very esoteric at all. Four-sphere theory removes $\mathbf{R}^3$ as basic space and posits that $S^4(R)$ with $R = 3075.69Mpc$ is absolute space of Nature. The radius is so large that for many problems, the distortion due to stereographic projection is extremely small. But despite being large, it is the zonal spherical harmonics, natural due to spherical geometry, that is the *explanation* of all particle and photon localisation in nature. This last point is one of the most central discoveries regarding Nature. While quantum phenomena had been originally discovered experimentally from 1900-1930, my four-sphere theory is the first satisfactory explanation for their source, the four-sphere geometry of absolute space that simply and clearly explains all wave-particle duality of Nature without extraordinary effort or artificial elements. Then it is the four-sphere geometry that allows us an absolute coordinate basis for doing all manner of computations, which is by the basis of global Killing spinor fields, and distributions and measurable functions on S^4 as their *coefficients*. This is a consequence of the work of Christian Bär [1].

Each of the parts of this infrastructure have been the result of great studies by mathematicians, for measurable functions and integration, Henri Lebesgue's works and his contemporaries like Emile Borel. For distribution theory Sergei Sobolev and Laurent Schwartz. For the natural Dirac operator on four-sphere Michael Atiyah and Isadore M. Singer. But once the illustrious mathematical efforts are put together, this particular infrastructure provides a full infrastructure for analysis of all macroscopic physics problem with many complex issues already handled so that there are few worries. All macroscopic physics phenomena *possible* are handled here, and four-sphere theory posits that there is nothing else in nature at all.

Obviously you will need to take many copies of these to produce settings for large systems, but the substantial point is that above $\delta = 10^{-15}$ cm there is nothing in Nature besides these spinor fields at all. For example magnetic monopoles might exist in voluminous quantities in nature, and they might have the property that they are not in the *physical hypersurface* at all. They will be accomodated in our infrastructure because they will be spinor fields too.

Particular electrodynamics problems might require ingenuity to put in this form; but in principle this is possible, so I won't try to translate all the problems of John David Jackson's *Classical Electrodynamics* to this form any time soon. But those and everything else in macroscopic physics will fit in this framework.

I am very satisfied with this marvelous collapse and merge of rigorous mathematics with a coherent unified physics because it seems *very right* and I am very confident that this is in fact the truth of Nature presented in beautiful mathematical form. All manner of quantum mysticism has disappeared here and rigorous mathematics here is simple and clear and actually enlightening rather than obscuring the physics.

7. Distributions Are Part Of Physical Theory

I have argued elsewhere for the first time that the reason for my four-sphere theory to consider distributional spinor fields to be *physical* is that the fundamental law of macroscopic physics in the theory, the *Ahmed-d'Alembert Law* or *S4 Electromagnetic Law* is a wave equation, but on spinor fields of a four-sphere. The infrastructure above gives us concreteness for specifying mathematically precise foundations for what this means in practice. Distributions *ought to be physical* in Nature because fundamental solutions of wave equations are quite often only distributional. And all sorts of configurations of distributional spinor fields could be the result of *physical engineering*.

In other words, a priori, using the fact that the fundamental law is a wave equation on spinor fields, a clever experimental physicist with his engineer friends, such as some version of the cast of *Big Bang Theory*, could produce all manner of arrangements of the world so that arbitrary distributional spinor fields are solutions to physics problems, and then those distributional solutions could be experimentally verified as the best theory of arrangement of things in Nature as well.

It is not merely that I am extending any theory here. Four-sphere theory is my theory; as the originator of the theory, I am making the prediction that distributional arrangements are plentiful in Nature and experimental physicists ought to re-orient their minds to seeking them.

The universe, I posit contain *no quantum fields whatsoever* and *many distributional spinor fields on four-sphere geometry.* Go forth and discover these oh intrepid experimental physicist and add to Zulfikar Moinuddin Ahmed's glorious immortality!

8. The History Of "My Beloved People The Human Race"

I do not use "my beloved people the human race" very lightly. It was a process that led to a revelation deep within my soul, that the entire human race is my beloved people". It was not quick this deep metanoia deep within my soul, and it was a glorious moment when it suddenly appeared to me like the epiphany that would transform my life, a rapturous revelation, an understanding that was so deep, so crisp and clear that I knew from that moment on that I would always have to refer to the human race as my beloved people.

It all started with my childhood. My father, Khondkar Miran Ahmed, was an Anglophile Bengali, and he bought me books on British Inventions, took me to the British Council Museum in Dhaka when I was young, repeated Newton's Laws of motion and was quite fond of all things English. But he served the Bengali people with every fiber of his body. The meaning of his life revolved around his people. I moved to America with my mother, Sadequa Ferdause Ahmed, and I was already an Atheist, with various interests, and assimilated into the American culture. But once past my twenties I felt something was missing from me because I was not a white American and so on. Eventually it just appeared brightly to me that my beloved people was the human race! It was from reading T. S. Eliot's *The Waste Land*. Ah the sweet refrain.

> "My feet are at Moorgate, and my heart Under my feet. After the event He wept. He promised a 'new start.' I made no comment. What should I resent?"

> "On Margate Sands. I can connect Nothing with nothing. The broken fingernails of dirty hands. My people humble people who expect Nothing." la la
>
> To Carthage then I came
>
> Burning burning burning burning O Lord Thou pluckest me out O Lord Thou pluckest
>
> burning

I felt this hit me deep within and I looked at the page. My people, humble people, my people the human race. Epiphany! And so it was that my people the human race, my beloved people became part of my normal consciousness.

Now having decided with certainty that my beloved people is the human race, naturally rational intelligence can act as an unerring guide to what is desirable for me. The future of my beloved people must be better than the past, and that led me to my Natural Rights World Order. This is a rational consequence that is clear and bright. *If indeed* my beloved people is the human race, *then* I must desire what is better for the well-being of my people in the *future* that is better than *the past.* Therefore I was led to propose several ideas. First was my idea of a *Great Republic Of Humanity.* That failed, and I settled for my *Natural Rights World Order.* Then I did use Martin Luther King, Jr. rhetoric without any shame.

I have a Dream. I have a Dream that one day the natural rights of all my beloved people shall be secure without exception, and the entire planet shall know just peace. I have a Dream that every child born on this world shall have their Life, Liberty, and pursuit of Happiness protected by effort of people who are sure of what is right and what is wrong. No man and no woman shall have to worry any longer of forces of oppression shall disturb their Life, Liberty and pursuit of Happiness.

9. Rational Sizing Up

Who is this little scrub Bill Gates? He has some advantages and some disadvantages. I am greater than Albert Einstein, Paul Dirac, Erwin Schroedinger, Edwin Hubble, Alexander Friedmann, George Lemaitre, James Clerk Maxwell, and Isaac Newton because my four-sphere theory is the exact theoretical physics. I am greater than Friedrich Nietzsche and Immanuel Kant because my Universal Human Moral nature is true and their theories of human morals are wrong. I am an immortal genius.

Do you really think that an Evil Sorceror without proper high school understanding of natural rights in America who uses black magic and death magicks of Moloch and all sorts of other habijabi on my deep interior, a career charlatan, who has a measly $131 billion is going to be greater than Zulfikar Moinuddin Ahmed? That is laughable. I laugh and laugh at the absurdity. Obviously by Virtues and immortality of my genius accomplishments I am greater than the little hick peasant-boy from podunk nowheresville boondocks in the Northwest frontiers. I am a scholar and a gentleman, an urban sophisticate, a literate man who is quite familiar with the great works of Thomas Mann, and have thoroughly studied the works of Thomas Bernhard and Jose Saramago, who has watched Medea many times to appreciate the filmography of a master, have familiarity with Andrei Tarkovsky's ouvre and of Federico Fellini. It is so funny when one of these hick illiterates think they will challenge the greatness of Zulfikar Moinuddin Ahmed. This *Bill Gates* has been thoroughly exposed by my keen senses. He can fool all these gullible American white people but he will hardly fool me.

10. Hausdorff Spaces

A topological space X is separated or Hausdorff if it satisfies the Hausdorff Separation Axiom: for any two points $x, y \in X$ there exists a neighbourhood U of x and a neighbourhood V of y so that $U \cap V = \emptyset$. In a Hausdorff topological space the limit of a convergent sequence is unique.

In the topology of manifolds, Hausdorff axiom is the most abundant situation. People do not often consider non-Hausdorff situations at all.

For whatever reasons, in functional analysis issues of topology for *weak convergence* had constantly led to technical mumbo-jumbo related to Hausdorff Axiom suddenly becoming a delicate issue. This is the fault of Jon Von Neumann. He began to consider technical questions of all manner of totally strange topologies on spaces of functions in the 1920s. I consider the whole field to be mostly technical mumbo-jumbo without significant *mathematical substance*. Are there really examples of *locally convex topological vector spaces* that are not just test functions and distributions? I highly doubt it. But for whatever infernal reason, people thought to proliferate this technical mumbo-jumbo to outrageous amount of details. This is a significant *unnecessary bloat* in mathematics without mathematical substance. I have conjectured that there ought to be some results that put an end to this proliferation of useless technical extravaganza without mathematical substance, perhaps a result that says that every locally convex topological vector space is isomorphic in some reasonable sense to Schwartz test function space and distributions. I do not think there is any true mathematical enlightenment in this morass of issues of locally convex topological spaces at all. I do not believe that mathematical research in these directions is a fruitful use on anyone's time.

11. Problem 1.10 Friedlander And Joshi

Construct a function $\varphi \in C_c^\infty(\mathbf{R})$ such that $\varphi \geq 0$ and $\mathrm{supp}(\varphi) \subset (-1, 1)$ and

$$\psi_n(x) = \varphi(x-n) / \sum_{m \in \mathbf{Z}} \varphi(x-m)$$

is a partition of unity subordinated to the cover $\{(n-1, n+1)\}_{n \in \mathbf{Z}}$.

This is a nice exercise. What I will do is parametrize the family with an very small $0 < \eta < 1$.

This exercise is all about massaging the joints near the end points. Let's construct a function $g(x)$ on $[0, \eta]$ with $g(0) = 1$ and $g(\eta) = 0$. How about

$$g(x) = e^{1 - \frac{1}{1 - x/\eta}}$$

This will do. We can move this function to $[1-\eta, 1]$ and then reflect it and construct a function that is smooth, zero at $x = -1$ and $x = 1$ and identically 1 in $[-1+\eta, 1-\eta]$.

Then we can translate it by integers. The problem is how do massage the joints $(k - \eta, k + \eta)$.

References

[1] Christian Bär, The Dirac Operator On Space Forms Of Positive Curvature, J. Math Soc. Japan, 48(1), 1996, 69–83

[2] https://github.com/zulf73/S4TheoryNotes