Research Topic Outline

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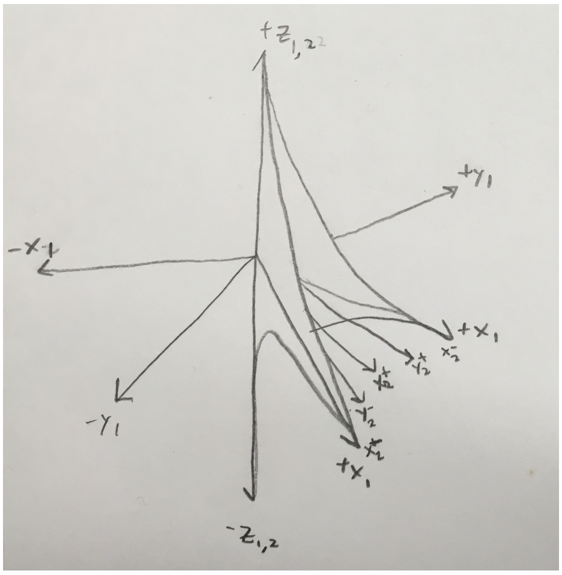
1 Introduction

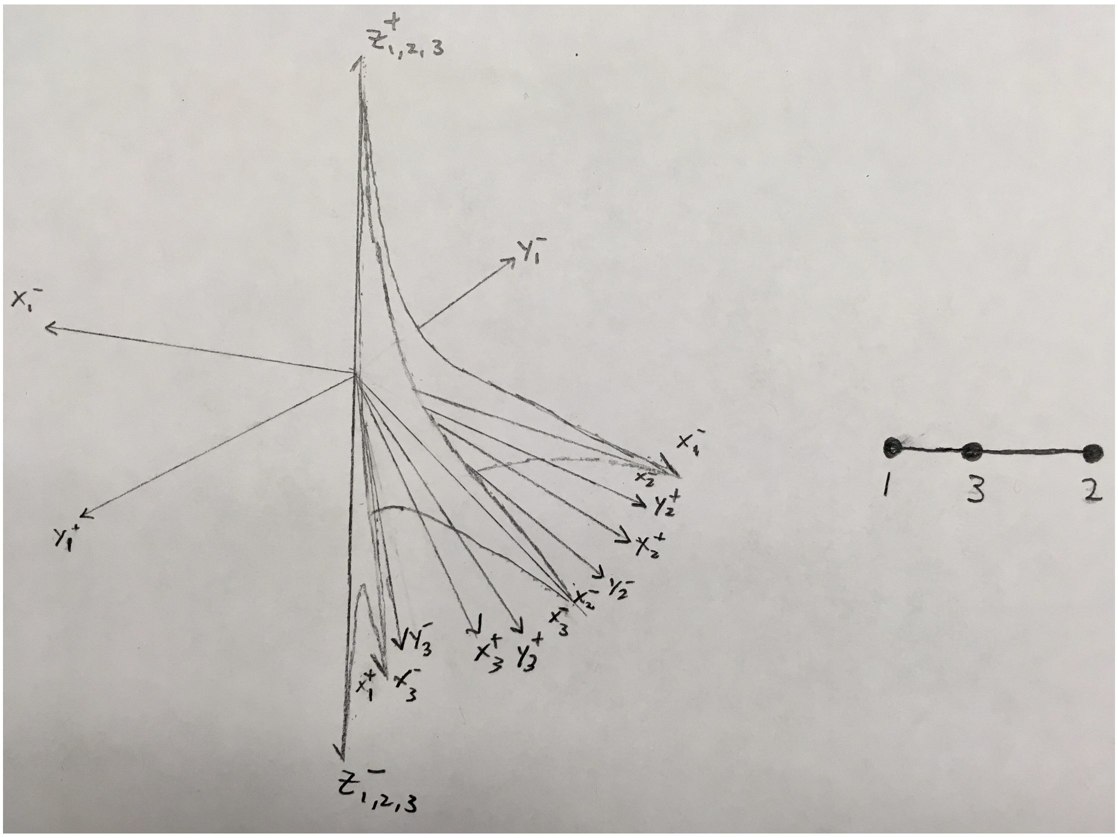
One of the aspects of my topic that makes it unique to other models is the ”infinte-book” concept. Since the first dimension is made of 0-d points, the 2nd of 1-d lines, the 3rd of 2-d planes, then the fourth can be made of 3-d spaces. Since we live in the third dimension, we cannot fully visualize the fourth dimension. However, we can view a *segment* of the fourth dimension using a series of three-dimensional spaces.



(a) A 4D line segment split about the z-axis

This is where I'd like to introduce the infinite-book concept. As shown above, we have a four-dimensional line segment. If you notice, there are two 3D spaces here. The second space, $< x_2, y_2, z_2 >$, is folded between the positive x-axis of the first space, and as we continue our motion through the fourth dimension in the direction of the second space, the second space will expand to take up a larger portion of the diagram, and will begin to instead fold the first space behind it until it *”disappears”* from the diagram.

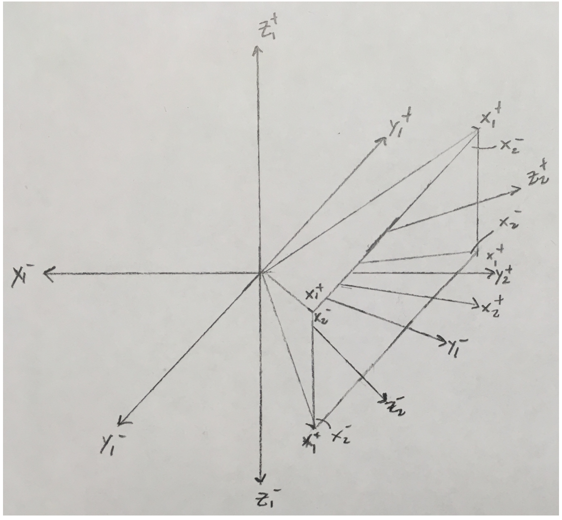
It should be worth noting, that because this space is continuous, if you observe the parts of the diagram that imply some sort of boundary between the two spaces, that there are an uncountable number of spaces in between the two spaces we see here, just as there are an uncountable number of single points between any two points on a line segment.



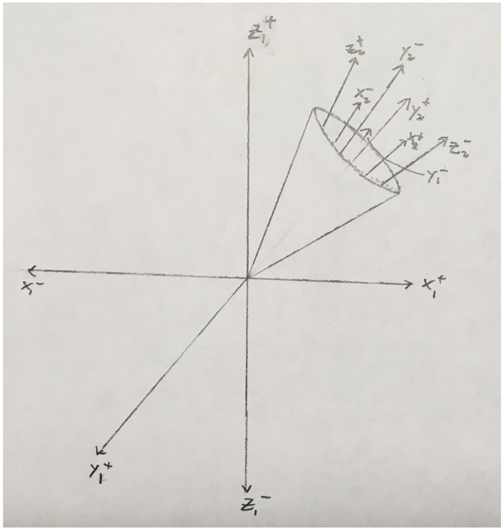
(a) A 4D line segment with some midpoint and analogous 1D segment

As you can see above, we are peeling open one of those boundaries to show yet another space, space 3, folded between the boundary of the first and second spaces. I'm not sure yet on how to show this visually, other than assume that $space_1 \leq space_3 \leq space_2$.

There are other questions that can be asked about this diagram, such as: Does the proportion of volume that one space takes up over another in the diagram signify anything? Why does the space split around the z-axis like that? I don't have answers to those questions, but I though it would be worthwile to explore some of the different ways in which we can demonstrate traveling between 3D spaces.



(a) 4D line segment showing a rectangular transition through the x-axis



(b) 4D line segment showing a circular transition at an arbitrary angle