Re: Einstein's math and physical objects

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2005−01/2690.html

---

dseppala_at_austin.rr.com
Date: 01/13/05

```
Date: Thu, 13 Jan 2005 20:27:31 GMT
```

On 13 Jan 2005 11:57:30 −0800, "Todd" <tsny11@hotmail.com> wrote:

>After much thinking, I believe the description of what happens is
>something like the following. I will use A and B for the reference
>frames (although originally I think these denoted the two disks.)
>
>As a preliminary thought experiment, imagine a solid rubber cylinder
>with axis coinciding with the x−axis. In frame B the cylinder is not
>sliding along the x−axis − it is just rotating about the x−axis.
>Back in frame A, the cylinder is sliding along the x−axis while it
>rotates and it APPEARS TWISTED. Imagine what you would have to do to
>the cylinder to make it appear UNtwisted in frame A. You would have to
>apply EXTERNAL twisting forces to the cylinder. Suppose you manage to
>do this so that the cylinder now APPEARS untwisted in frame A. In
>frame B, the cylinder is now twisted and B−observers will explain this
>as do to the application of the external twisting forces. A−observers
>see a rather odd situation where the cylinder APPEARS untwisted but is
>actually experiencing large internal twisting stresses caused by the
>external twisting forces. If the external forces are removed, the
>cylinder will resume its relaxed shape where it is untwisted in B and
>twisted in A.
>
>OK, now consider David's original situation where the rotating disks
>accelerate from frame A to frame B and it is ASSUMED that the wires
>remain parallel to the x−axis in frame A as the system undergoes
>acceleration. I think the important thing to realize is that this can
>only happen if complicated EXTERNAL FORCES act on the wires during the
>acceleration and continue to act after the acceleration is over. These
>external forces will, in fact, distort the wires into a rotating helix
>shape in frame B (the wires don't touch) and the helix shape will be
>maintained as long as the external forces remain applied.
>
>If these external forces are removed after the acceleration is over,
>then the wires will 'relax' and assume a shape due to internal forces
>(stresses) alone. This relaxed shape will be the crossed/touching
>configuration! From the point of view of B, the wires will now form
>essentially straight lines that cross half−way between the disks
>(assuming 180 degree relative rotation between the disks in B). From

>the point of view of A, the 'relaxed' shape of each wire will be a
>helix with VARIABLE RADIUS. As the wires leave one disk the radius of
>each helix decreases linearly with distance from the disk until the
>radius of each helix becomes zero at the halfway point between the
>disks. The wires cross (touch) at this point. Then the radius of each
>helix increases again as you move from this point to the second disk.
>
>If, during the acceleration phase, no external forces were applied to
>the wires, then I believe they will NOT remain parallel to the x−axis
>in A even though the disks never have any _relative_ rotation in frame
>A! As odd as it seems, I think that Frame A will see the wires distort
>during the acceleration into the 'relaxed' variable radius helix
>configuration described above and touch in the middle. In frame B they
>will assume the straight line crossing configuration.
>[Blasts of criticism welcome!]
>
>Todd
>

If you do some simple experiments rotating disks with two strings attached, you will find that if the disks have less than 180 degrees of rotation, you can take your finger, for example, and place it between the separated wires at one disk and slide it along through the wires until you reach the other disk. However if the disks have a relative rotation greater than 360 degrees, you cannot do this. A knot forms which prevents you from sliding your finger all the way between the wires from one disk to the other disk. In the original rest frame, one can always slide their finger from one disk to the other, even if you view the wires/strings as a helix with zero diameter − the wires don't entangle each other. In the final rest frame, this is impossible because of the knot that forms.
David