Re: translation and rotation in Euclidean space

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2008−10/msg02129.html

- *From*: "Androcles" <Headmaster@xxxxxxxxxxxxxxx>
- *Date*: Sat, 25 Oct 2008 18:06:06 +0100

"John Polasek" <jpolasek@xxxxxxxxxx> wrote in message
news:b4g6g4llu7j8ssojcpiupsdrkuq89a742t@xxxxxxxxxx

> On Sat, 25 Oct 2008 04:54:31 +0100, "Androcles"
> <Headmaster@xxxxxxxxxxxxxxxx> wrote:
> snip
>
>> advance for any help.
>> Best...Frank
>
>> Another flagrant case of the vanishing OP. He posts a poorly framed
>> problem, confusing distance with length, introducing a, b, u, v
>> without defining them, and now we have a half dozen kindly experts
>> poring and proposing amongst themselves, with nary any evidence that I
>> have seen, that the OP is still there or even interested.
>
>> In the first place the rotation can only be done by multiplying the
>> vector by a 3x3 matrix
>
> which is a 2nd rank tensor, isomorphic to one axis of a gimbal set.
>
>> In the second place a single rotation only requires a 2x2 matrix.
>> [cos −sin]
>> [sin cos]
>
>> In the third place a 3x3 matrix permits rotation in pitch, roll and yaw,

A rotation in any of pitch. roll or yaw can be done with a 2x2 if you
want to play that way.

Of course, but when you have a full database such as many computer games like "Flight Simulator" or even Google Earth or Google Sketchup do and wish to rotate and translate a scene it is helpful if you process all
relevant points (vectors) with a single 4x4 matrix. That way you don't need to recompute.

> in the fourth place a 4x4 matrix can be used to include translation.
>
> In the fifth place your first place is wrong.

> I didnt notice he was stuck in 2 dimensions. But a rotation matrix is a 2d rank tensor, say Lij, a vector is a 1st rank tensor say Xi and they cannot be combined in some kind of 4x4 and still be a tensor. This 4x4 tensor cannot be rotated, just as the metric tensor cannot be rotated. It's a donkey matrix.

Ok.

> Be a good guy and show Frank how to write your 4x4 matrix.

That's all over the web:
http://tinyurl.com/5vsnqs

This is obviously a translation ; (−) is a dummy variable:

[0 0 0 0] [a] [d]
[0 0 0 0] * [b] = [e]
[0 0 0 0] [c] [f]
[d/a, e/b, f/c, 0] [(−)] [0]

Likewise a null rotation is obvious:

[1 0 0 0] [a] [a]
[0 1 0 0] * [b] = [b]
[0 0 1 0] [c] [c]
[0, 0, 0, 0] [(−)] [0]

Now the question becomes :
Do we want to translate and then rotate or
rotate first and then translate?

It's really just a question of how the scene changes as
you move or an object in the scene moves.

If you are watching a car move along a highway then
that's different to being in a car watching the world
passing by you. And you might be doing both.

http://www.androcles01.pwp.blueyonder.co.uk/Vector/RP.gif

> (By the way, where is Frank/Athan anyway?)

No idea. Probably cheesed off by all the cranks mumbling crap
they couldn't program a computer to do. sci.physics.relativity
is a kook NG. <shrug>
I only post here to take the piss out of them, which is why nobody
likes me.
http://www.androcles01.pwp.blueyonder.co.uk/QUESTION.htm

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