**1. Collision Detection of an Entity using OneBlades**

In my project, the viewport boundaries are represented as OneBlades. To detect collision between the entity and the viewport OneBlade, I calculate the unsigned distance between them. I make use of the inner product to get this unsigned distance. I use this result of this calculation to check when this collision should occur.

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**2. Rotation around a Pivot/Pillar using Rotors**

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To rotate an entity/ThreeBlade around a fixed pivot, you first calculate the rotor R. A sandwich operation, using the entity’s previous position and the newly calculated rotor, is then used to determine the new position of the entity. I utilize this formula for player rotation around a fixed pivot/pillar in the game scene.

**3. Reflection of an Entity**

I use reflection in 2 cases in my project: accurate collision reflection of the viewport walls, and in a mechanic where the player can reflect themselves around a pillar in the game scene.

When an entity encounters the viewport OneBlades, I need a reflection calculation to correctly simulate the deflection of the entity. The player can move towards a viewport OneBlade at different angles so to accurately accommodate this, I reflect my player off the walls. I calculate this by using a sandwich operation with my entity’s movement direction and the plane it collided with.

To recreate a reflection of a ThreeBlade/entity across a ThreeBlade/pillar, a tri-reflection calculation is used. This calculation consists of a sandwich operation between the pillar P, the new translation motor based off my entity’s movement direction and the elapsed seconds, the previous entity’s position.

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