2025-03-11 UN

I'm trying to project a line onto a point and it looks like I need to meet a plane with a point. I've already coded up point ∧ plane. I wonder what it looks like the other way around? My gut feeling is -ve of $r \wedge p$

plane ∧ point $= p \wedge r$

$= (p.e_1 + p.e_2 + p.e_3 + p.e_0) \wedge$

$(r.e_{032} + r.e_{013} + r.e_{021} + r.e_{123})$

$= (p.e_1)(r.e_{032})\, e_{1032}$

$+ (p.e_2)(r.e_{013})\, e_{2013}$

$+ (p.e_3)(r.e_{0\overset{21}{\cancel{12}}})\, e_{3021}$

$+ (p.e_0)(r.e_{123})\, e_{0123}$

remember $e_1 \wedge e_1 = 0$ and so on...

Wow, so it does end up being $-r \wedge p$

$p \wedge r$ = a dual quaternion with

$dq.w = dq.e_{23} = dq.e_{31} = dq.e_{12} = 0$

$dq.e_{01} = dq.e_{02} = dq.e_{03} = 0$

$$
\begin{aligned}
dq.e_{0123} = {} & (p.e_1)(r.e_{032}) \\
& + (p.e_2)(r.e_{013}) \\
& + (p.e_3)(r.e_{021}) \\
& + (p.e_0)(r.e_{123})
\end{aligned}
$$