Proportional Navigation

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Proportional navigation Assume this version of proportional navigation:

$$\frac{d\gamma}{dt} = N\frac{d\theta}{dt} \tag{1}$$

Here, θ is the change in line-of-sight. The line-of-sight, in the angle of the vector connecting the predator and the prey. Thus the change in line-of-sight in the change in this relative angle (fixing the predator as the base of the coordinate system and measuring how fast the prey rotates around it. The γ is the angle of the velocity of the predator, and N is some proportionality constant that can be tweaked to optimize interception. Thus the change in the angle of the heading of the predator is proportional to the change in line-of-sight.
How can we implement this strategy in code?
This angular velocity of the line of sight is calculated with

$$\omega = \theta = \frac{|v_r| sin\psi}{|r|} = \frac{r \times v_r}{|r|^2} \tag{2}$$

Where r is the difference in position between prey and predator, and v_r is the difference in velocity, $\times$ denotes the cross product, ψ is the angle between r and v_r. The reasoning behind the equation is as follows
(see https://en.wikipedia.org/wiki/Angular_velocity). We want to get the element of the difference in velocity which is perpendicular to the difference in position. We know that:

$$| \perp v| = \sin\psi * |v| = \frac{r \times v_r}{|r| * |v|} * |v| = \frac{r \times v_r}{|r|} \tag{3}$$

We divide this by the length of r again to get ω. This relation between the cross product and the sine can be found here:
https://en.wikipedia.org/wiki/Cross_product
under geometric meaning.