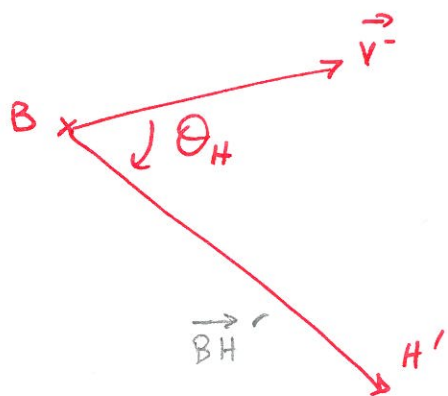


I) Projection dans le plan horizontal contenant B

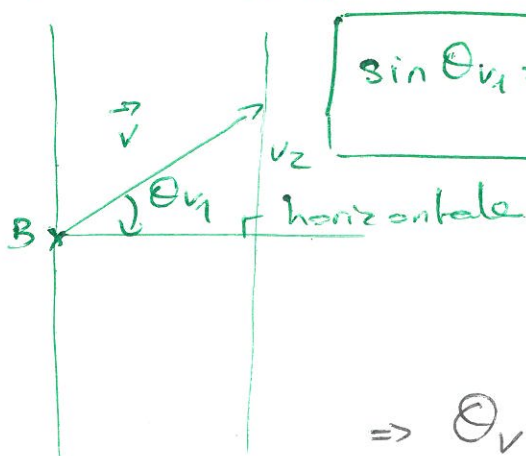


$$\vec{V} \cdot \vec{BH'} = \|\vec{V}\| \times \|\vec{BH'}\| \times \cos \theta_H$$

$$\Rightarrow \cos \theta_H = \frac{\vec{V} \cdot \vec{BH'}}{\|\vec{V}\| \times \|\vec{BH'}\|}$$

$$\cos \theta_H = \frac{v_x(x_H - x_B) + v_y(y_H - y_B)}{\sqrt{v_x^2 + v_y^2} \cdot \sqrt{(x_B - x_H)^2 + (y_B - y_H)^2}}$$

II) Projection dans le plan vertical contenant B et \vec{V}



$$\sin \theta_{v1} = \frac{|v_z|}{\|\vec{V}\|}$$

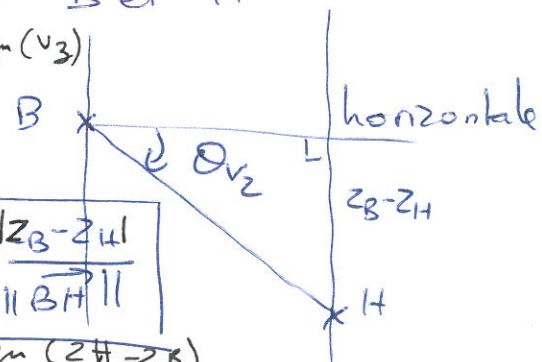
$$s_1 = \text{sign}(v_z)$$

$$\sin \theta_{v2} = \frac{|z_B - z_H|}{\|\vec{BH}\|}$$

$$s_2 = \text{sign}(z_H - z_B)$$

$$\Rightarrow \theta_V = s_1 \theta_{v1} + s_2 \theta_{v2}$$

III) Projection dans le plan vertical contenant B et H



vérifier signes