

To calculate the horizontal position the kinematic differential equations are needed:

$$\dot{n} = u \cos \psi - v \sin \psi \quad (1)$$

$$\dot{e} = u \sin \psi + v \cos \psi \quad (2)$$

For small angles the following approximation can be used:

$$\dot{n} = u - v\delta_\psi \quad (3)$$

$$\dot{e} = u\delta_\psi + v \quad (4)$$