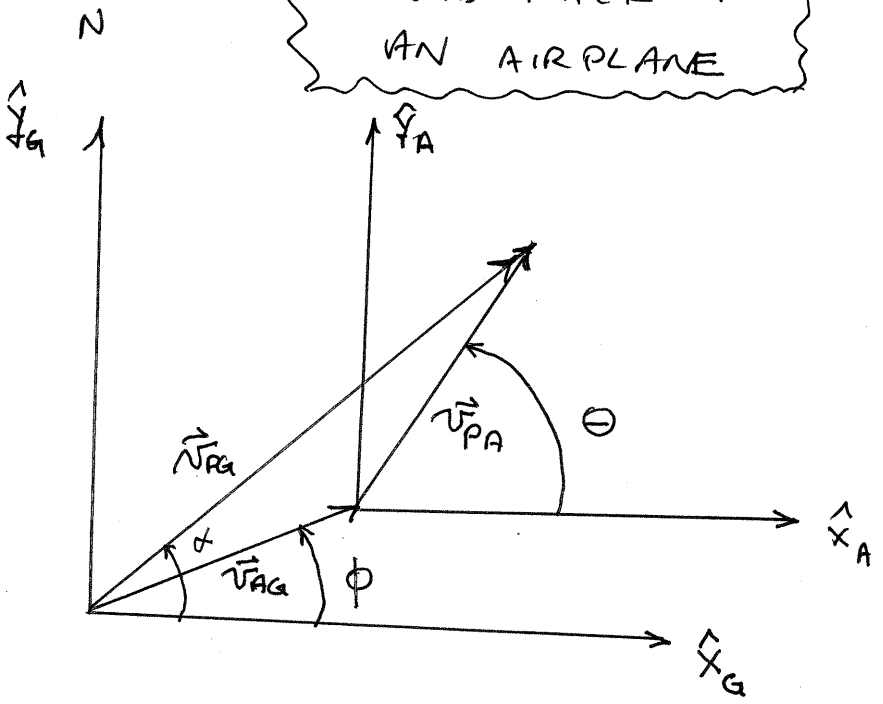
9/21/06

CALCULATING THE GROUND TRACK OF AN AIRPLANE



NOTE THAT X AND y AXES ARE PARALLEL IN BOTH COORDINATE SYSTEMS

$\vec{v}_{AG} \equiv$ Velocity of AIR RELATIVE TO GROUND $\equiv$ Wind Velocity Vector. DEFINED BY wind speed $|\vec{v}_{AG}|$ AND DIRECTION $\& \phi$

$\vec{v}_{PA} \equiv$ Velocity of PLANE RELATIVE TO AIR Defined by AIRSPEED $|\vec{v}_{PA}|$ And INDICATED HEADING Θ

$$\vec{v}_{PG} = \vec{v}_{PA} + \vec{v}_{AG}$$

$$\vec{v}_{PA} = |\vec{v}_{PA}|\cos\Theta\,\hat{x} + |\vec{v}_{PA}|\sin\Theta\,\hat{y}$$

$$\vec{v}_{AG} = |\vec{v}_{AG}|\cos\phi\,\hat{x} + |\vec{v}_{AG}|\sin\phi\,\hat{y}$$

$$\vec{v}_{PG} = (|\vec{v}_{PA}|\cos\Theta + |\vec{v}_{AG}|\cos\phi)\hat{x} + (|\vec{v}_{PA}|\sin\Theta + |\vec{v}_{AG}|\sin\phi)\hat{y}$$

$\chi \equiv$ TRUE HEADING

$$\chi = \tan^{-1}\frac{(\vec{v}_{PG})_y}{(\vec{v}_{PG})_x}$$