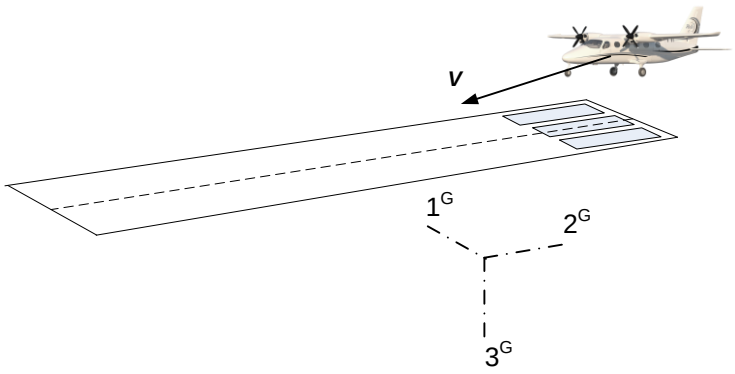
Assignments

Modeling Flight Dynamics with Tensors

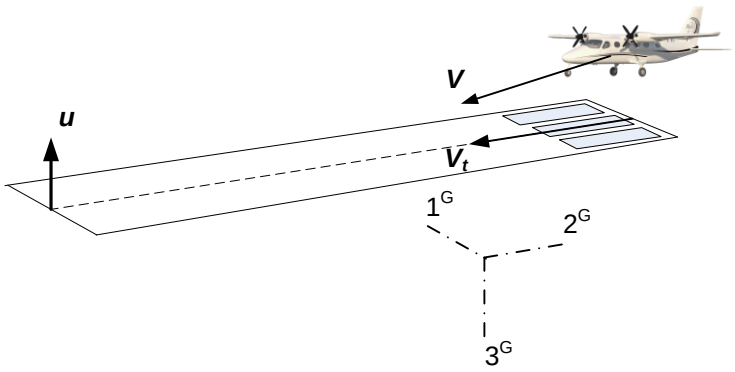
Lecture 2

Problem 1 Coordinate Transformation



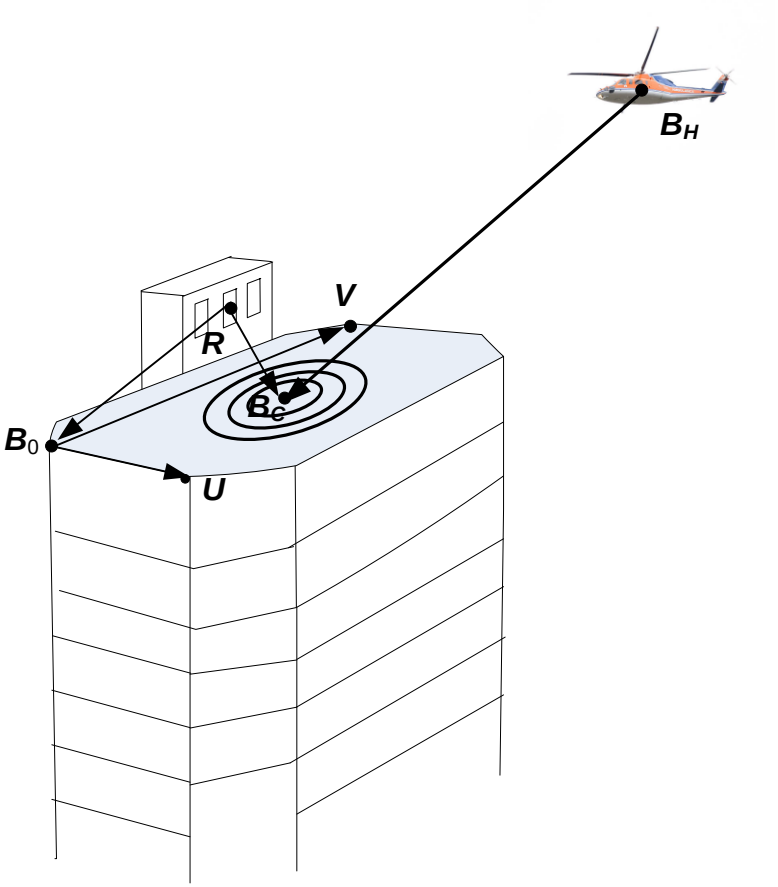
An airplane approaches Runway ***27*** with the speed V = 80 m/s at a glide path angle of Υ = -20 deg. What is its ground speed $[v]^G$ in the geographic coordinates of North 1^G, East 2^G, Down 3^G?

Problem 2 Plane Projection Tensor N



Use the projection tensor **N** of Slide 11 to model the projection $\boldsymbol{v_t}$ of the velocity vector $\boldsymbol{v}$ onto the landing strip, whose orientation is given by the unit vector $\boldsymbol{u}$. Then convert the tensor relationship into a matrix relationship by introducing the $]^G$ coordinate system and crunch the numbers to obtain $[v_t]^G$.

Problem 3 Flat Plane



On top of a tall business high-rise is centered a helipad. A helicopter B_H approaches for a landing and needs to establish a glide-slope vector $\mathbf{s}_{B_C B_H}$. To determine B_C, use the flat plane equation of Slide 13. You can assume that the locations of the points on the periphery of the building B_0, U, V are known, as well as the traffic controller's point R.