Climbing and descending flight- Introduction

Introduction to Aeronautical Engineering

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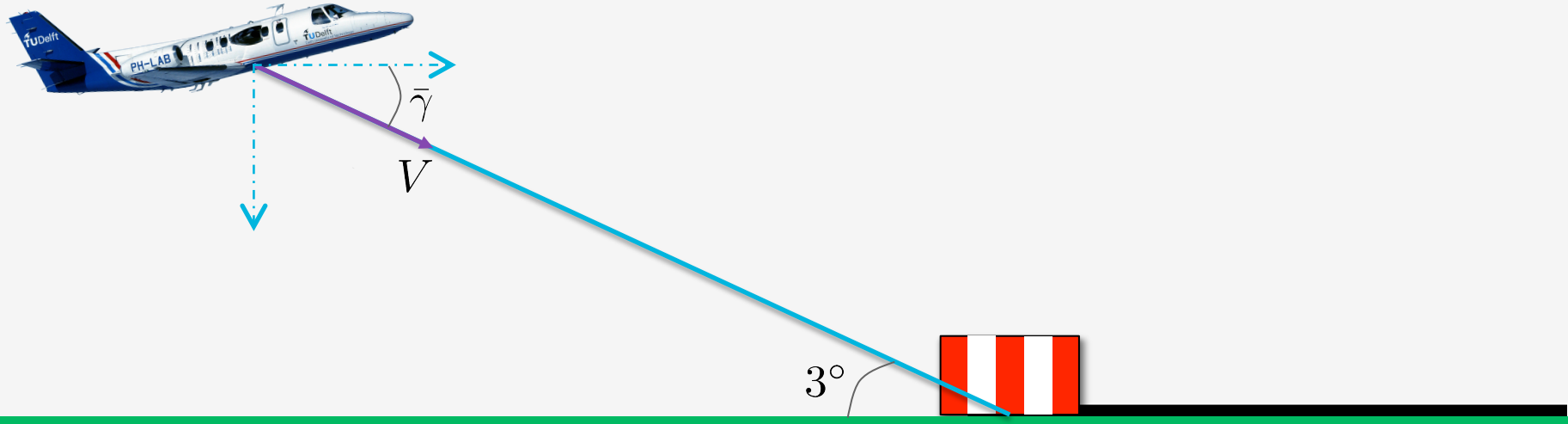
Steep climb

Fast climb

Glide distance

Minimum rate of descent

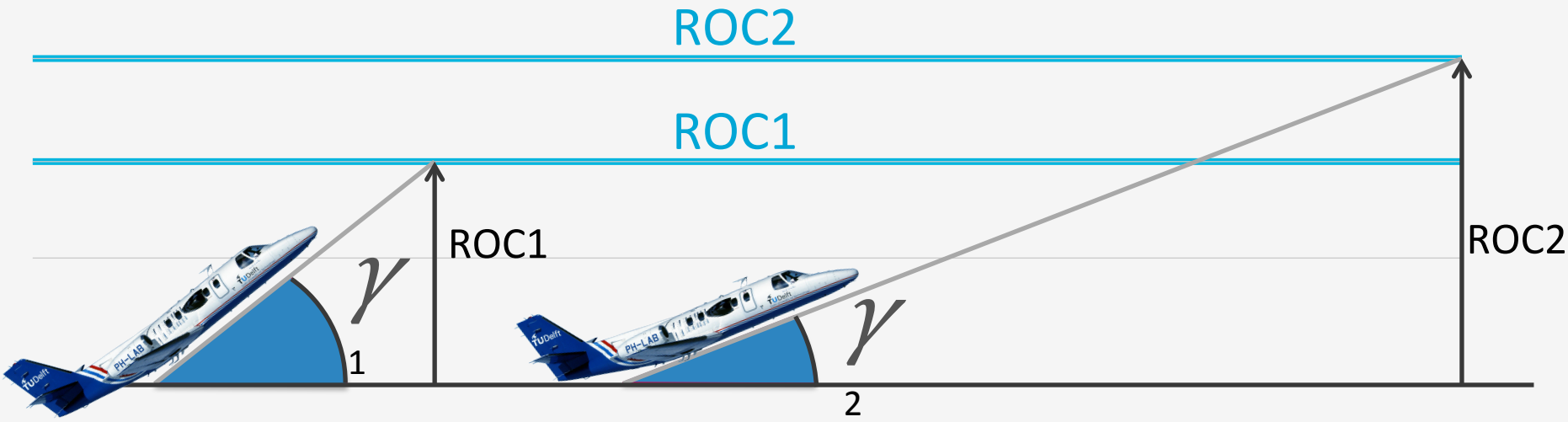
Glideslope



Glideslope (2)

- Fuel required
- Time
- Optimal airspeed

Rate of Climb (ROC) vs. flight path angle (γ)

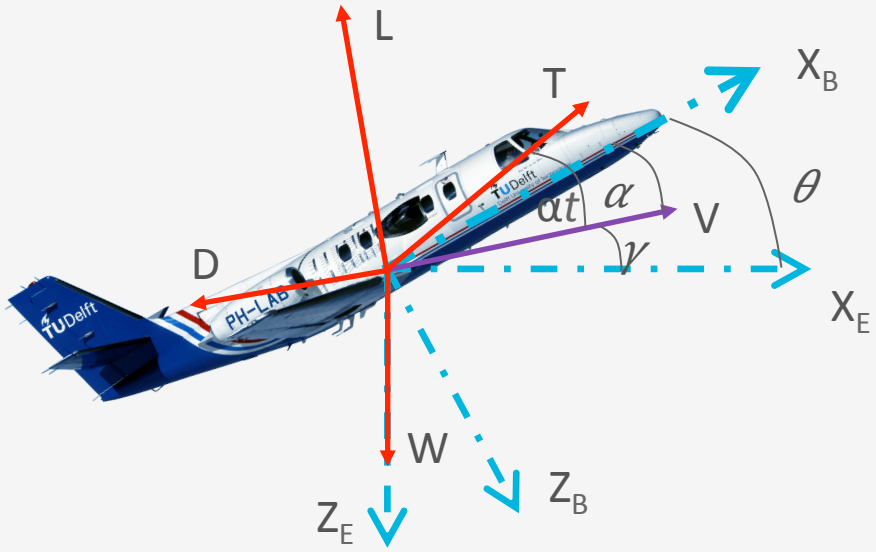


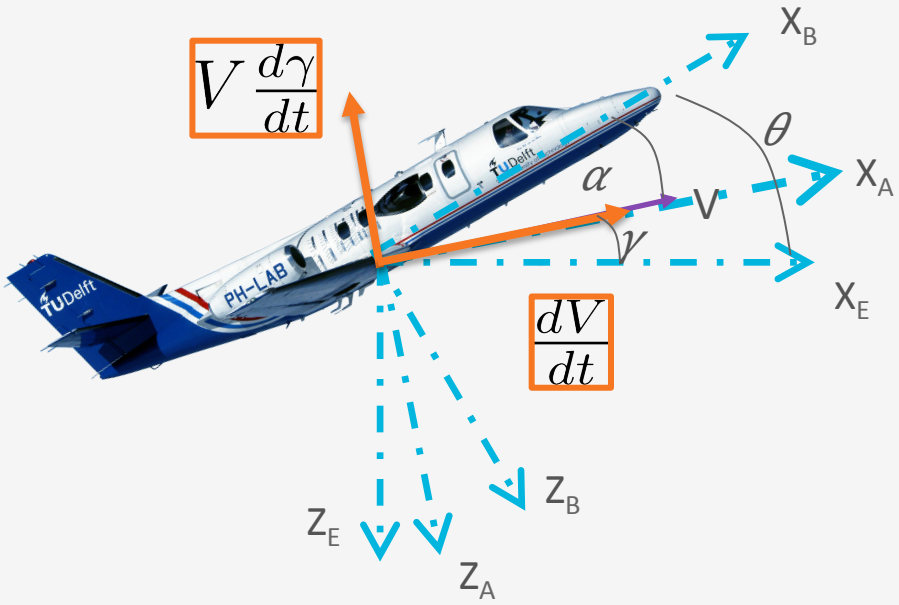
$\gamma_1 > \gamma_2$ **BUT** ROC1 < ROC2

Importance of climb angle

Importance of rate of climb

Free-body & kinetic diagram





Equations of Motion

$$\sum F_{\parallel V} : \frac{W}{g}\frac{dV}{dt} = T\cos\alpha_t - D - W\sin\gamma$$

$$\sum F_{\perp V} : \frac{W}{g}V\frac{d\gamma}{dt} = L - W\cos\gamma + T\sin\alpha_t$$

Equations of Motion

$$\mathbf{L} = \mathbf{W}$$

$$\sin\gamma = \frac{\mathbf{T}-\mathbf{D}}{\mathbf{W}}$$

$$\mathbf{V}\sin\gamma = \frac{\mathbf{P_a}-\mathbf{P_r}}{\mathbf{W}} = \mathrm{ROC}$$

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