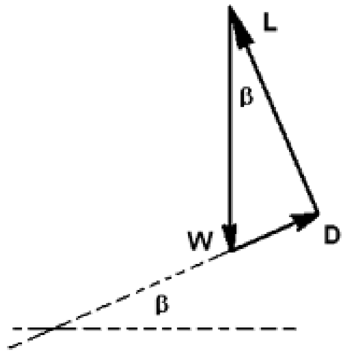
Solution to Problem 292D

Since the only forces acting on the glider are the lift(L), the drag(D) and the weight(W), these must balance according to the force diagram: where the angle β is the glide angle.



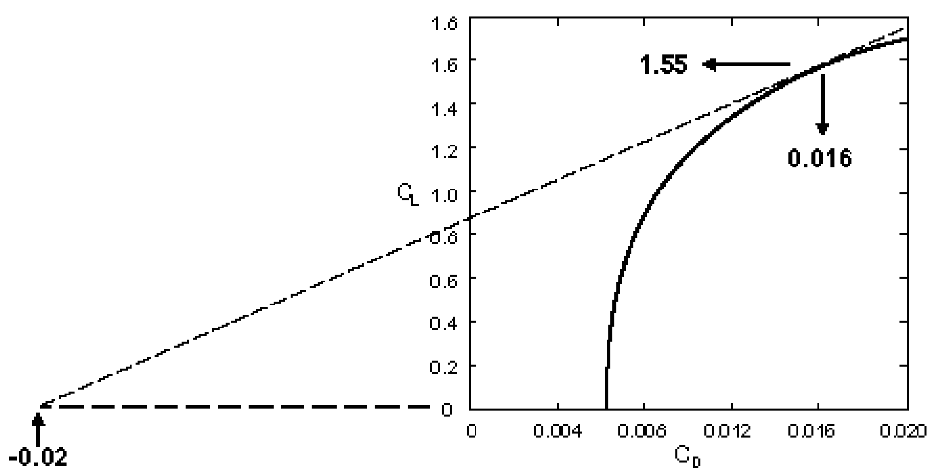
Now the total drag on the glider is composed of drag on the wings and additional drag on the fuselage so that

$$\tan\beta = \frac{\text{Total Drag}}{\text{Lift}} = \frac{(C_D)_{wings} + (C_D)_{additional}}{C_L}$$

Therefore

$$\tan\beta = \frac{(C_D)_{wings} + 0.02}{C_L}$$

so, if on the graph given in the problem, we draw a line through the point $(-0.02, 0)$ which is also tangent to the curve, the



minimum glide angle, β, will be given by the values of C_L and C_D at the tangent point or

$$\beta_{min} = \arctan\left(\frac{0.016 + 0.02}{1.55}\right) = 1.33^o$$