7.5 Nonsteady Glide at Const. C_L

$T=0$ γ small $\dot{\gamma}$ negligible $C_D = C_D(C_L)$

$$\dot{x} = V$$
$$\dot{h} = V\gamma$$
$$\dot{V} = (g/W)(-D - W\gamma)$$
$$0 = L - W$$

From $L=W$, $C_L = \text{Const} \Rightarrow \quad V = \sqrt{\frac{2W}{\rho S C_L}}$

$$E_s = h + \frac{V^2}{2g} \qquad \dot{E}_s = \dot{h} + \frac{V\dot{V}}{g} = -\frac{DV}{W}$$

$$\frac{dx}{dE_s} = -\frac{W}{D} = -\frac{L}{D} = -E = \text{Const.}$$

$$x_f - x_0 = -E\int_{E_{s0}}^{E_{sf}} dE_s = -E(C_L)\left(E_{sf} - E_{s0}\right)$$

$$x_f - x_0 = E(C_L)\left(E_{s0} - E_{sf}\right)$$

$$x_f - x_0 = E(C_L)\left[h_0 + \frac{V_0^2}{2g} - h_f - \frac{V_f^2}{2g}\right]$$

If E_{s0} and E_{sf} are fixed max $x_f - x_0$ occurs when C_L is such that E is max.