Technical Note on Cruising Actions Flight Model of Page fm03

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By assuming the weight W varies as a linear function of distance x, W=Ax+B, where A and B are expressed in terms of α, β, W_F, W_0, xc, and x_d, and by minimizing the thrust-to-velocity ratio, T_R/V_∞, two approximate relations between V_c and V_d can be derived: one for very high-altitude flights (42000 ft-55000 ft), and one for medium-altitude flights (22000 ft– 40000 ft).

To determine the corresponding maximum range and the equilibrium velocity during the flight, the following equation needs to be satisfied:

$$\int_{Wc}^{Wd} -dW = \int_{xc}^{xd} Ct \{T_R/V_\infty\} \, dx$$

where Ct is the fuel consumption rate.

Refs: J. D. Anderson, Jr., Introduction *to Flight* 4th ed., McGraw-Hill Book Co.,2000.

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