EQUATIONS

By assuming 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, xc, and x_d, an approximate relation between V_c and V_d can be derived by minimizing $\frac{T_R}{V_\infty}$:

$$Vd^4 = Vc^4 - \frac{32}{\rho^2 S^2 C_{D,0} \pi e AR}\left[0.5\,\mathrm{A}^2\,(xd^2 - xc^2) + \mathrm{AB}(xd - xc)\right] \quad (1)$$

The following equation can now be imposed to determine the range:

$$\int_{Wc}^{Wd} -dW = \int_{xc}^{xd} Ct\,\frac{T_R}{V_\infty}\,dx \quad (2)$$

; Ct is the fuel consumption rate.

APPLICATION

As a sample application, the following data of a typical executive jet of gross weight 39600 lbs and fuel capacity 11400 lbs., cruising at 22,000 feet:

Xc (mi)	**Vc (fps)**	**Xd (mi)**	**Vd (fps)**	**T_R (lbs.)**
20.6	780	2987	689	3596
20.6	755	3072	652	3431
20.6	730	3149	611	3214
20.6	705	3205	566	3129
20.6	680	3199	513	2994
20.6	655	3017	445	2871

(more to appear)