

Free Variables	Units	Description
AR_w	[-]	Wing aspect ratio
C_{D_w}	[-]	Drag coefficient, wing
$C_{D_{i_w}}$	[-]	Wing induced drag coefficient
$C_{D_{p_w}}$	[-]	Wing parasitic drag coefficient
C_{L_w}	[-]	Lift coefficient, wing
$C_{L_{\alpha-w}}$	[-]	Lift curve slope, wing
D_w	[N]	Wing drag
L_w	[N]	Wing lift
L_{ht}	[N]	Horizontal tail downforce
$L_{w_{max}}$	[m]	Max lift generated by wing
L_{total}	[N]	Total lift generated by aircraft
M	[-]	Cruise Mach number
Re_w	[-]	Cruise Reynolds number (wing)
S_w	[m ²]	Wing area
V_∞	[$\frac{m}{s}$]	Freestream velocity
$V_{fuel,max}$	[m ³]	Available fuel volume
W	[lbf]	Aircraft weight
W_S	[$\frac{N}{m^2}$]	Wing loading
$W_{fuel,total}$	[lbf]	Total fuel weight
W_{fuel}	[lbf]	Fuel weight on aircraft at any point in flight
W_{struct_w}	[lbf]	Wing box weight
W_{total}	[lbf]	Aircraft max weight
W_{wing}	[lbf]	Wing weight
ΔL_o	N	Center wing lift loss
ΔL_t	N	Wing tip lift loss
Δx_{ac_w}	N	Wing aerodynamic center shift
α_w	[-]	Wing angle of attack
\bar{c}_w	[m]	Mean aerodynamic chord (wing)
η_o	[-]	Center wing span coefficient
λ_w	[-]	Wing taper ratio
μ	[$\frac{N \cdot s}{m^2}$]	Dynamic viscosity
ρ_∞	[$\frac{kg}{m^3}$]	Freestream density
τ_w	[-]	Wing thickness/chord ratio
b_w	[m]	Wing span
c_{root_w}	[m]	Wing root chord
c_{tip_w}	[m]	Wing tip chord
e	[-]	Oswald efficiency factor
$f(\lambda_w)$	[-]	Empirical efficiency function of taper
p_w	[-]	Substituted variable = $1 + 2 \cdot \text{taper}$
p_o	[$\frac{N}{m}$]	Center section theoretical wing loading

q_w	[−]	Substituted variable = $1 + \text{taper}$
$y_{\bar{c}_w}$	[m]	Spanwise location of mean aerodynamic chord

WingBox

I_{cap}	[−]	Non-dim spar cap area moment of inertia
$L_{ht_{max}}$	[N]	Maximum horizontal tail downforce
M_r	[N]	Root moment per root chord
W_{cap}	[lbf]	Weight of spar caps
$W_{fuel_{wing}}$	[lbf]	Maximum fuel weight carried in wing
W_{web}	[lbf]	Weight of shear web
ν	[−]	Dummy variable = $(t^2 + t + 1)/(t + 1)^2$
t_{cap}	[−]	Non-dim. spar cap thickness
t_{web}	[−]	Non-dim. shear web thickness
