Includi << ..\Default_Functions.mcdx

LONGITUDINAL PARAMETERS INITIALIZATION

Hidden Area --> Import of Excel INPUT Data

Hidden Area --> Preliminary Mapping of imported Data

Hidden Area --> Import and preliminary mapping of OTHER Excel Data

Other input parameters to be defined here

$\alpha_{dot} := 0.375 \cdot \frac{rad}{s} = 21.4859 \ \frac{deg}{s}$

$q := 0.0445 \cdot \frac{rad}{s} = 2.5497 \ \frac{deg}{s}$

$\alpha_{dot\_bar} := \frac{\alpha_{dot} \cdot MAC_W}{2 \cdot V_1} = 0.00884$

$\alpha_{dot\_bar} = 0.506507 \ deg$

$q_{bar} := \frac{q \cdot MAC_W}{2 \cdot V_1} = 0.001049$

$q_{bar} = 0.060106 \ deg$

LONGITUDINAL PARAMETERS

Input parameters

$mass = (2.853 \cdot 10^5)\ kg$

$C_{D0} = 0.031$

$\xi_{CG} = 0.275$

$\Delta X\_W_{LE}\_Nose = 25.05\ m$

$\Delta X\_HT_{LE}\_Nose = 63.4\ m$

$N_{eng\_1} = 2$

$\Delta X\_CG\_eng_1 = 7.97\ m$

$Y_{eng\_1} = 9.67\ m$

$\Delta Z\_eng_1\_CG = 1.03\ m$

$N_{eng\_2} = 0$

$\Delta X\_CG\_eng_2 = 0\ m$

$Y_{eng\_2} = 0\ m$

$\Delta Z\_eng_2\_CG = 0\ m$

$D_{eng} = 3.1\ m$

$\varepsilon_{\alpha\_eng} = 0.22$

$C_{N\alpha'\_eng} = 0.137$

Imported parameters

$M_1 = 0.65$

$V_1 = 201.6\ \frac{m}{s}$

$p_{dyn} = (1.131 \cdot 10^4)\ Pa$

$d_B = 6.33\ m$

$C_{M0\_B} = -0.0521$

$\xi_{ac\_WB} = 0.178$

$X_{MAC\_LE\_H} = 3.705\ m$

$MAC_H = 5.2\ m$

$\xi_{ac\_H} = 0.277$

$C_{L\alpha\_H} = 0.0737\ deg^{-1}$

$\tau_e = 0.552$

$i_H = -3.0023\ deg$

$\alpha_{0L\_H} = -2.865\ deg$

$S_H = 105.41\ m^2$

$\eta_H = 0.9$

$C_{h\_\alpha\_e} = -0.0001\ deg^{-1}$

$C_{h\_\delta\_e} = -0.0002\ deg^{-1}$

$C_{M\_ac\_H} = 0$

$MAC_W = 9.505\ m$

$X_{MAC\_LE\_W} = 6.341\ m$

$b_W = 60.92\ m$

$C_{L\alpha\_W} = 0.1016\ deg^{-1}$

$i_W = 1.9996\ deg$

$\alpha_{0L\_W} = -1.3293\ deg$

$C_{M\_ac\_W} = -0.0053$

$\varepsilon_{0\_W} = 0.8422\ deg$

$\varepsilon_{\alpha\_W} = 0.252$

$\Lambda_{W\_c4\_eqv} = 34.4921\ deg$

$\xi_{ac\_W} = 17.819\ deg$

$S_W = 468.83\ m^2$

$AR_W = 7.916$

$e_W = 0.866$

FUNDAMENTAL COEFFICIENTS AND DISTANCES

Aircraft Lift, Drag, Pitch moment coefficients

$$C_L := \frac{mass \cdot g}{p_{dyn} \cdot S_W} = 0.5277$$

$$C_L = 0.5277$$

$$C_M := 0$$

$$C_M = 0$$

$$C_D := C_{D0} + \frac{C_L^{\,2}}{\pi \cdot AR_W \cdot e_W} = 0.0439$$

$$C_D = 0.0439$$

$$L := p_{dyn} \cdot C_L \cdot S_W = \left(2.7978 \cdot 10^6\right)\ N$$

$$L = \left(2.853 \cdot 10^5\right)\ kgf$$

$$D := p_{dyn} \cdot C_D \cdot S_W = \left(2.3292 \cdot 10^5\right)\ N$$

$$D = \left(2.3751 \cdot 10^4\right)\ kgf$$

Center of gravity, aerodynamic centers and volume ratios

$$x_{CG} := \xi_{CG} \cdot MAC_W = 2.6139\ m$$

$$x_{CG} = 2.6139\ m$$

$$\Delta X\_CG\_Nose := x_{CG} + X_{MAC\_LE\_W} + \Delta X\_W_{LE}\_Nose = 34.0049\ m$$

$$\Delta X\_CG\_Nose = 34.0049\ m$$

$$\Delta \xi\_HT_{ac}\_W_{MAC\_LE} := \frac{\left(\Delta X\_HT_{LE}\_Nose - \Delta X\_W_{LE}\_Nose\right) - X_{MAC\_LE\_W} + X_{MAC\_LE\_H} + \xi_{ac\_H} \cdot MAC_H}{MAC_W} = 3.9089$$

$$\Delta \xi\_HT_{ac}\_W_{MAC\_LE} = 3.9089$$

$$\Delta X\_HT_{ac}\_CG := \left(\Delta X\_HT_{LE}\_Nose - \Delta X\_W_{LE}\_Nose\right) - X_{MAC\_LE\_W} + X_{MAC\_LE\_H} + \xi_{ac\_H} \cdot MAC_H - x_{CG} = 34.5405\ m$$

$$\Delta X\_HT_{ac}\_CG = 34.5405\ m$$

$$VolumeRatio_H := \frac{S_H \cdot \Delta X\_HT_{ac}\_CG}{S_W \cdot MAC_W} = 0.817$$

$$VolumeRatio_H = 0.817$$

STICK FIXED AERODYNAMIC COEFFICIENTS

Wing-Body-HTail Lift coefficient curve slopes and basic values

$K_{WB} := 1 + 0.025 \cdot \left(\frac{d_B}{b_W}\right) - 0.25 \cdot \left(\frac{d_B}{b_W}\right)^2 = 0.9999$ $\quad K_{WB} = 0.9999$

$C_{L\alpha\_WB} := K_{WB} \cdot C_{L\alpha\_W} = 5.8214$ $\quad C_{L\alpha\_WB} = 0.1016\ deg^{-1}$

$C_{L\alpha} := C_{L\alpha\_WB} + \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} \cdot \left(1 - \varepsilon_{\alpha\_W}\right) = 6.4606$ $\quad C_{L\alpha} = 0.1128\ deg^{-1}$

$C_{LiH} := \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} = 0.8545$ $\quad C_{LiH} = 0.01491\ deg^{-1}$

$C_{L\delta e} := \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} \cdot \tau_e = 0.4717$ $\quad C_{L\delta e} = 0.00823\ deg^{-1}$

$C_{L0\_WB} := C_{L\alpha\_WB} \cdot i_W = 0.2032$ $\quad C_{L0\_WB} = 0.2032$

$C_{L0} := C_{L0\_WB} - \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} \cdot \varepsilon_{0\_W} = 0.1906$ $\quad C_{L0} = 0.1906$

$C_{D\alpha} := \frac{2 \cdot C_L \cdot C_{L\alpha}}{\pi \cdot AR_W \cdot e_W} = 0.3166$ $\quad C_{D\alpha} = 0.0055\ deg^{-1}$

Wing-Body-HTail Pitch momentum coefficient curve slopes and basic values

$C_{M\alpha} := C_{L\alpha\_WB} \cdot \left(\xi_{CG} - \xi_{ac\_WB}\right) - \eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot \left(1 - \varepsilon_{\alpha\_W}\right) = -1.7581$ $\quad C_{M\alpha} = -0.03068\ deg^{-1}$

$C_{MiH} := -\eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H = -3.1053$ $\quad C_{MiH} = -0.0542\ deg^{-1}$

$C_{M\delta e} := -\eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot \tau_e = -1.7141$ $\quad C_{M\delta e} = -0.02992\ deg^{-1}$

$C_{M0\_WB} := C_{M\_ac\_W} + C_{M0\_B} + C_{L0\_WB} \cdot \left(\xi_{CG} - \xi_{ac\_WB}\right) = -0.0377$ $\quad C_{M0\_WB} = -0.0377$

$C_{M0} := C_{M0\_WB} + \eta_H \cdot \frac{S_H}{S_W} \cdot \frac{MAC_H}{MAC_W} \cdot C_{M\_ac\_H} + \eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot \varepsilon_{0\_W} = 0.008$ $\quad C_{M0} = 0.00798$

Unsteady flight coefficients

$C_{L\alpha\_dot} := 2 \cdot C_{L\alpha\_H} \cdot \eta_H \cdot VolumeRatio_H \quad \varepsilon_{\alpha\_W} = 1.5651$

$C_{L\alpha\_dot} = 0.0273 \ deg^{-1}$

$C_{M\alpha\_dot} := -C_{L\alpha\_dot} \cdot \left(\Delta\xi\_HT_{ac}\_W_{MAC\_LE} - \xi_{CG}\right) = -5.6874$

$C_{M\alpha\_dot} = -0.0993 \ deg^{-1}$

$$C_{Lq\_part1} := \left(\frac{AR_W + 2\cos\left(\Lambda_{W\_c4\_eqv}\right)}{AR_W \cdot \left(\sqrt{1 - {M_1}^2 \cdot \left(\cos\left(\Lambda_{W\_c4\_eqv}\right)\right)^2}\right) + 2 \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)}\right) \cdot \left(\frac{1}{2} + 2 \cdot \left|\xi_{ac\_W} - \xi_{CG}\right|\right) \cdot C_{L\alpha\_W} = 3.8225$$

$C_{Lq\_part2} := 2 \cdot C_{L\alpha\_H} \cdot \eta_H \cdot VolumeRatio_H = 6.2106$

$C_{Lq} := C_{Lq\_part1} + C_{Lq\_part2} = 10.0331$

$C_{Lq} = 0.1751 \ deg^{-1}$

$K_q = 0.7829$

$$C_{Mq\_part1} := \left(\frac{\left(\frac{{AR_W}^3 \cdot \left(\tan\left(\Lambda_{W\_c4\_eqv}\right)\right)^2}{AR_W + 6 \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)}\right) + \frac{3}{\sqrt{1 - {M_1}^2 \cdot \left(\cos\left(\Lambda_{W\_c4\_eqv}\right)\right)^2}}}{\left(\frac{{AR_W}^3 \cdot \left(\tan\left(\Lambda_{W\_c4\_eqv}\right)\right)^2}{AR_W + 6 \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)}\right) + 3}\right) \cdot \left(-K_q \cdot C_{L\alpha\_W} \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)\right) = -0.0673 \ deg^{-1}$$

$$C_{Mq\_part2} := \left(\frac{AR_W \cdot \left(0.5 \cdot \left|\xi_{ac\_W} - \xi_{CG}\right| + 2 \cdot \left|\xi_{ac\_W} - \xi_{CG}\right|^2\right)}{AR_W + 2 \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)} + \frac{1}{24} \cdot \left(\frac{{AR_W}^3 \cdot \left(\tan\left(\Lambda_{W\_c4\_eqv}\right)\right)^2}{AR_W + 6 \cdot \cos\left(\Lambda_{W\_c4\_eqv}\right)}\right) + \frac{1}{8}\right) = 0.0157 \ deg^{-1}$$

$$C_{Mq} := C_{Mq\_part1} \cdot C_{Mq\_part2} - 2 \cdot C_{L\alpha\_H} \cdot \eta_H \cdot VolumeRatio_H \cdot \left(\frac{\Delta X\_HT_{ac}\_CG}{MAC_W}\right) = -26.041$$

$C_{Mq} = -0.4545 \ deg^{-1}$

Neutral point and Static Stability Margin

$$\xi_N := \frac{\xi_{ac\_WB} + \frac{C_{L\alpha\_H}}{C_{L\alpha\_WB}} \cdot \eta_H \cdot \frac{S_H}{S_W} \cdot \left(1 - \varepsilon_{\alpha\_W}\right) \cdot \Delta\xi\_HT_{ac}\_W_{MAC\_LE}}{1 + \frac{C_{L\alpha\_H}}{C_{L\alpha\_WB}} \cdot \eta_H \cdot \frac{S_H}{S_W} \cdot \left(1 - \varepsilon_{\alpha\_W}\right)} = 0.5471$$

$\xi_N = 0.5471$

$x_N := \xi_N \cdot MAC_W = 5.2004 \ m$

$x_N = 5.2004 \ m$

$\Delta X\_N\_Nose := x_N + X_{MAC\_LE\_W} + \Delta X\_W_{LE}\_Nose = 36.5914 \ m$

$\Delta X\_N\_Nose = 36.5914 \ m$

$SSM := \xi_{CG} - \xi_N = -0.2721$

$\frac{C_{M\alpha}}{C_{L\alpha}} = -0.2721$

ENGINES CONTRIBUTION

$T := D = (2.3292 \cdot 10^5)\ N$

$T = (2.3292 \cdot 10^5)\ N$

$T_c := \frac{T}{2 \cdot p_{dyn} \cdot D_{eng}^{\ 2}} = 1.0715$

$T_c = 1.0715$

$N_{eng} := N_{eng\_1} + N_{eng\_2} = 2$

$N_{eng} = 2$

$S_{eng} := \frac{\pi}{4} \cdot D_{eng}^{\ 2} = 7.5477\ m^2$

$S_{eng} = 7.5477\ m^2$

$C_{N\alpha\_eng} := N_{eng} \cdot C_{N\alpha'\_eng} \cdot (1 + \varepsilon_{\alpha\_eng}) = 0.3343$

$C_{N\alpha\_eng} = 0.0058\ deg^{-1}$

$C_{M0\_eng\_1} := 2 \cdot T_c \cdot \frac{D_{eng}^{\ 2}}{S_W} \cdot \frac{\Delta Z\_eng_1\_CG}{MAC_W} \cdot \frac{N_{eng\_1}}{N_{eng}} = 0.0048$

$C_{M0\_eng\_1} = 0.00476$

$C_{M\alpha\_eng\_1} := C_{N\alpha\_eng} \cdot \frac{S_{eng}}{S_W} \cdot \frac{\Delta X\_CG\_eng_1}{MAC_W} \cdot \frac{N_{eng\_1}}{N_{eng}} = 0.0045$

$C_{M\alpha\_eng\_1} = 0.00008\ deg^{-1}$

$C_{M0\_eng\_2} := 2 \cdot T_c \cdot \frac{D_{eng}^{\ 2}}{S_W} \cdot \frac{\Delta Z\_eng_2\_CG}{MAC_W} \cdot \frac{N_{eng\_2}}{N_{eng}} = 0$

$C_{M0\_eng\_2} = 0$

$C_{M\alpha\_eng\_2} := C_{N\alpha\_eng} \cdot \frac{S_{eng}}{S_W} \cdot \frac{\Delta X\_CG\_eng_2}{MAC_W} \cdot \frac{N_{eng\_2}}{N_{eng}} = 0$

$C_{M\alpha\_eng\_2} = 0\ deg^{-1}$

$\Delta\xi_{N\_eng\_1} := \frac{C_{M\alpha\_eng\_1}}{C_{L\alpha}} = 0.0007$

$\Delta\xi_{N\_eng\_1} = 0.0007$

$\Delta\xi_{N\_eng\_2} := \frac{C_{M\alpha\_eng\_2}}{C_{L\alpha}} = 0$

$\Delta\xi_{N\_eng\_2} = 0$

$\Delta\xi_{N\_eng} := \Delta\xi_{N\_eng\_1} + \Delta\xi_{N\_eng\_2}$

$\Delta\xi_{N\_eng} = 0.0007$

$\xi_{N\_eng} := \xi_N + \Delta\xi_{N\_eng}$

$\xi_{N\_eng} = 0.5478$

$x_{N\_eng} := \xi_{N\_eng} \cdot MAC_W = 5.2071\ m$

$x_{N\_eng} = 5.2071\ m$

$\Delta X\_N_{eng}\_Nose := x_{N\_eng} + X_{MAC\_LE\_W} + \Delta X\_W_{LE}\_Nose = 36.5981\ m$

$\Delta X\_N_{eng}\_Nose = 36.5981\ m$

$SSM_{eng} := \xi_{CG} - \xi_{N\_eng} = -0.2728$

$SSM_{eng} = -0.2728$

Equilibrium system solution and results

$\alpha_{WB} = 3.0003\ deg$ $\delta_e = 0.2016\ deg$

$\alpha_H := \alpha_{WB} \cdot (1 - \varepsilon_{\alpha\_W}) + i_H + \tau_e \cdot \delta_e - \varepsilon_{0\_W}$ $\alpha_H = -1.489\ deg$

$C_{LWB} := C_{L\alpha\_WB} \cdot (\alpha_{WB} + i_W)$ $C_{LWB} = 0.508$

$C_{LH} := C_{L\alpha\_H} \cdot \alpha_H$ $C_{LH} = -0.1097$

$L_{WB} := p_{dyn} \cdot S_W \cdot C_{LWB}$ $L_{WB} = (2.6936 \cdot 10^6)\ N$

$L_H := \eta_H \cdot p_{dyn} \cdot S_H \cdot C_{LH}$ $L_H = -1.1775 \cdot 10^5\ N$ $\frac{L_H}{L_{WB}} = -0.0437$

STICK FREE AERODYNAMIC COEFFICIENTS

$$F := 1 - \tau_e \frac{C_{h\_\alpha\_e}}{C_{h\_\delta\_e}} = 0.69 \qquad F = 0.69$$

$$C_{M0\_free} := C_{M0\_WB} + \eta_H \cdot \frac{S_H}{S_W} \cdot \frac{MAC_H}{MAC_W} \cdot C_{M\_ac\_H} + \eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot \varepsilon_{0\_W} \cdot F = -0.0062 \qquad C_{M0\_free} = -0.0062$$

$$C_{M\alpha\_free} := C_{L\alpha\_WB} \cdot (\xi_{CG} - \xi_{ac\_WB}) - \eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot (1 - \varepsilon_{\alpha\_W}) \cdot F = -1.0381 \qquad C_{M\alpha\_free} = -0.0181\ deg^{-1}$$

$$C_{MiH\_free} := -\eta_H \cdot C_{L\alpha\_H} \cdot VolumeRatio_H \cdot F = -2.1428 \qquad C_{MiH\_free} = -0.0374\ deg^{-1}$$

$$\alpha_{free} := -\frac{C_{M0\_eng\_1} + C_{M0\_eng\_2} + C_{M0\_free} + C_{MiH\_free} \cdot i_H}{C_{M\alpha\_free} + C_{M\alpha\_eng\_1} + C_{M\alpha\_eng\_2}} = 6.1457\ deg \qquad \alpha_{free} = 6.1457\ deg$$

$$\alpha_{H\_free} := \alpha_{free} \cdot (1 - \varepsilon_{\alpha\_W}) - \varepsilon_{0\_W} + i_H = 0.7525\ deg \qquad \alpha_{H\_free} = 0.7525\ deg$$

$$\delta_{e\_free} := -\frac{C_{h\_\alpha\_e}}{C_{h\_\delta\_e}} \alpha_{H\_free} = -0.4225\ deg \qquad \delta_{e\_free} = -0.4225\ deg$$

$$C_{L0\_free} := C_{L0\_WB} - \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} \cdot \varepsilon_{0\_W} \cdot F = 0.1945 \qquad C_{L0\_free} = 0.1945$$

$$C_{L\alpha\_free} := C_{L\alpha\_WB} + \eta_H \cdot \frac{S_H}{S_W} \cdot C_{L\alpha\_H} \cdot (1 - \varepsilon_{\alpha\_W}) \cdot F = 6.2625 \qquad C_{L\alpha\_free} = 0.1093\ deg^{-1}$$

$$C_{LiH\_free} := \eta_H \cdot C_{L\alpha\_H} \cdot \frac{S_H}{S_W} \cdot F = 0.5897 \qquad C_{LiH\_free} = 0.0103\ deg^{-1}$$

$$C_{L\_free} := C_{L0\_free} + (C_{L\alpha\_free} + C_{N\alpha\_eng}) \cdot \alpha_{free} + C_{LiH\_free} \cdot i_H = 0.8712 \qquad C_{L\_free} = 0.8712$$

$$C_{D\alpha\_free} := \frac{2 \cdot C_{L\_free} \cdot C_{L\alpha\_free}}{\pi \cdot AR_W \cdot e_W} = 0.5067 \qquad C_{D\alpha\_free} = 0.0088\ deg^{-1}$$

$$C_{D\_free} := C_{D0} + \frac{C_{L\_free}^{\ 2}}{\pi \cdot AR_W \cdot e_W} = 0.0662 \qquad C_{D\_free} = 0.0662$$

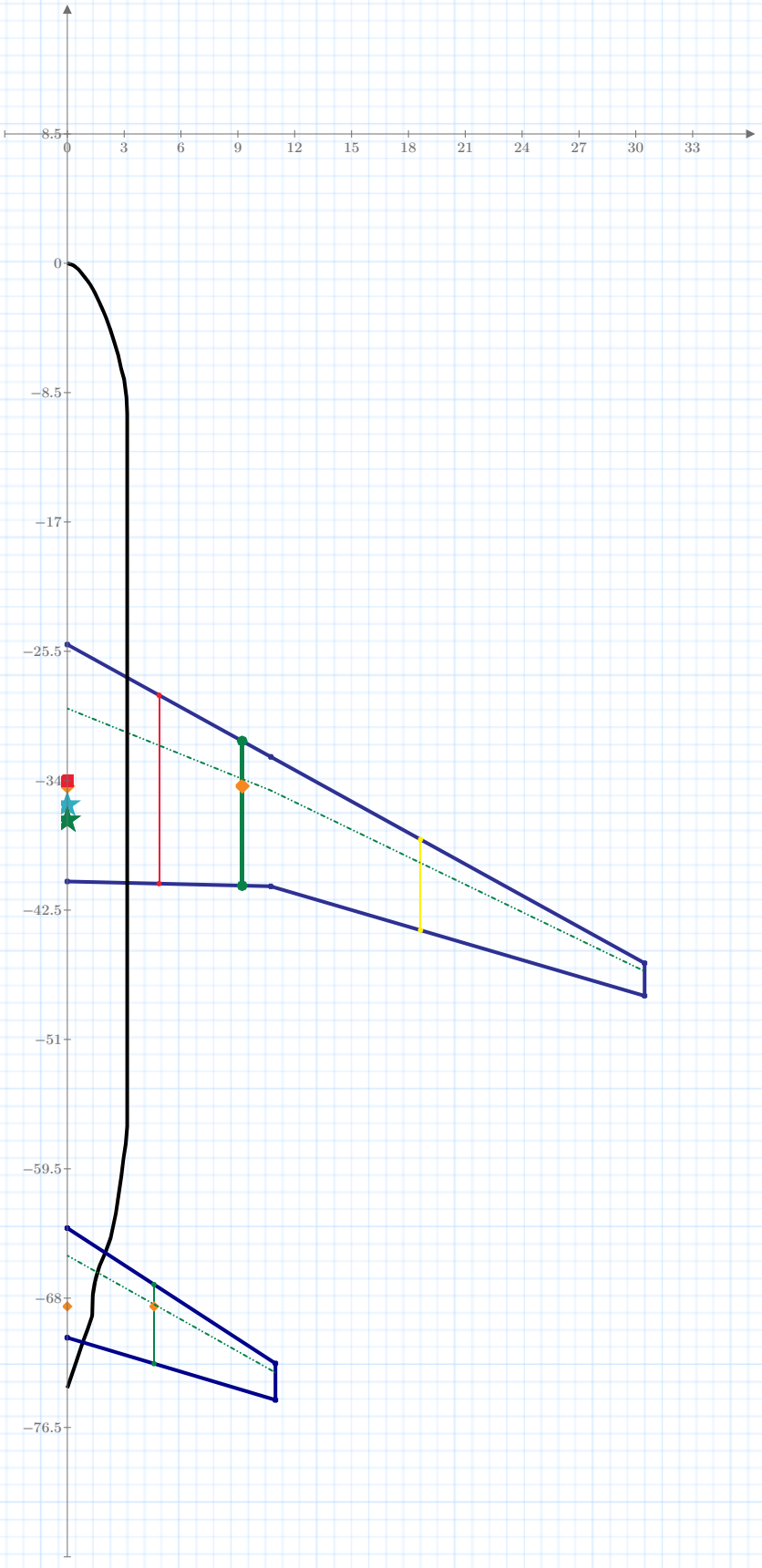
$$\xi_{N\_free} := \frac{\xi_{ac\_WB} + \frac{C_{L\alpha\_H}}{C_{L\alpha\_WB}} \cdot \eta_H \cdot \frac{S_H}{S_W} \cdot (1 - \varepsilon_{\alpha\_W}) \cdot \Delta\xi\_HT_{ac}\_W_{MAC\_LE} \cdot F}{1 + \frac{C_{L\alpha\_H}}{C_{L\alpha\_WB}} \cdot \eta_H \cdot \frac{S_H}{S_W} \cdot (1 - \varepsilon_{\alpha\_W}) \cdot F} = 0.4408$$

$$x_{N\_free} := \xi_{N\_free} \cdot MAC_W = 4.1895\ m \qquad x_{N\_free} = 4.1895\ m$$

$$\Delta X\_N_{free}\_Nose := x_{N\_free} + X_{MAC\_LE\_W} + \Delta X\_W_{LE}\_Nose = 35.5805\ m \qquad \Delta X\_N_{free}\_Nose = 35.5805\ m$$

$$SSM_{free} := \xi_{CG} - \xi_{N\_free} = -0.1658 \qquad SSM_{free} = -0.1658$$

WING-BODY-HTAIL PLANFORM WITH NEUTRAL POINTS



MAPPING AND OUTPUT CREATION

Includi << ../Default_Map_Longitudinal.mcdx

Excel Writing

$n_{sheet} := 6$

$First\_Row_{L\_1} := 4$

$Block_{L\_1} := {}_{f}\text{map\_matrix\_transform}\left({}_{m}Longit\_Data\_Map_{imported}\right)$

$Excel\_Output_{L\_1} := {}_{f}\text{write\_full\_output}\left({}_{s}Output\_Excel\_File, Block_{L\_1}, n_{sheet}, First\_Row_{L\_1}\right)$

$First\_Row_{L\_2} := First\_Row_{L\_1} + \text{rows}\left(Block_{L\_1}\right) + 2$

$Block_{L\_2} := {}_{f}\text{map\_matrix\_transform}\left({}_{m}Longit\_Data\_Map_{inpput}\right)$

$Excel\_Output_{L\_2} := {}_{f}\text{write\_full\_output}\left({}_{s}Output\_Excel\_File, Block_{L\_2}, n_{sheet}, First\_Row_{L\_2}\right)$

$First\_Row_{L\_3} := First\_Row_{L\_2} + \text{rows}\left(Block_{L\_2}\right) + 2$

$Block_{L\_3} := {}_{f}\text{map\_matrix\_transform}\left({}_{m}Longit\_Data\_Map\right)$

$Excel\_Output_{L\_3} := {}_{f}\text{write\_full\_output}\left({}_{s}Output\_Excel\_File, Block_{L\_3}, n_{sheet}, First\_Row_{L\_3}\right)$

TeX Macro writing on .tex

${}_{v}complete\_macros_{L} := \text{stack}\left(Block_{L\_1}{}^{\langle 2\rangle}, Block_{L\_2}{}^{\langle 2\rangle}, Block_{L\_3}{}^{\langle 2\rangle}\right)$

${}_{v}tex_{L} := {}_{f}\text{write\_matrix}\left(\text{“.\Output\LONGITUDINAL\_TeX\_Macros.tex”}, {}_{v}complete\_macros_{L}, \text{“ ”}\right)$