

Tapered Lifting Line Model

$$N := 500 \quad \theta(m) := \pi \cdot \frac{m}{N+1} \quad b := 7 \quad Cla := 2 \cdot \pi$$

$$cc := \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \quad yy := \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix} \cdot \frac{b}{2} \quad tt := \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} \cdot \frac{\pi}{180} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} \quad yt := \begin{bmatrix} -1 \\ -0.9 \\ -0.5 \\ 0.5 \\ 0.9 \\ 1 \end{bmatrix} \cdot \frac{b}{2}$$

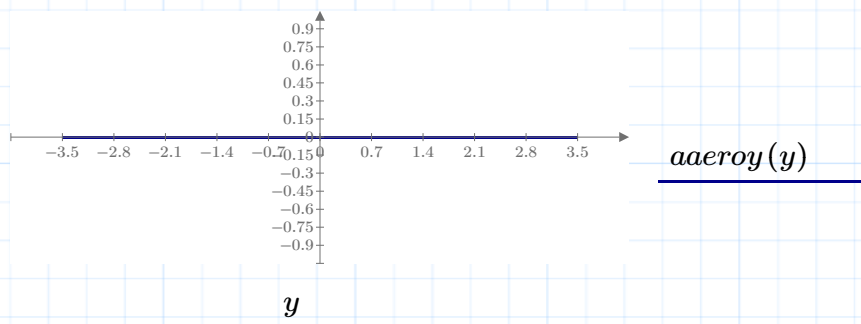
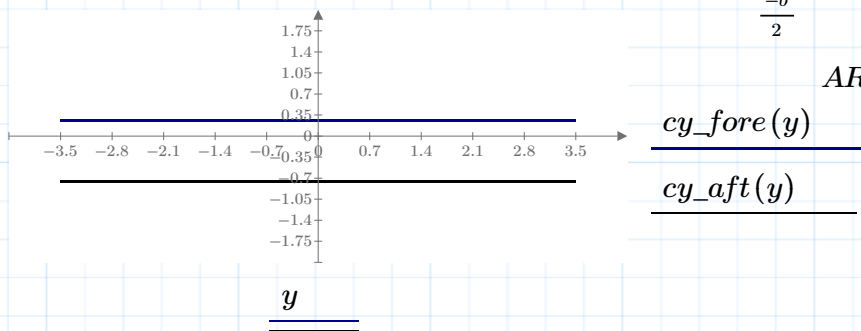
$$cy(y) := \text{linterp}(yy, cc, y)$$

$$aaero(y) := \text{linterp}(yt, tt, y)$$

$$c(\theta) := cy\left(\frac{b}{2} \cdot \cos(\theta)\right) \quad aaero(\theta) := aaero\left(\frac{b}{2} \cdot \cos(\theta)\right)$$

$$cy_{fore}(y) := \frac{cy(y)}{4} \quad cy_{aft}(y) := -cy(y) \cdot \frac{3}{4} \quad S := \int_{\frac{-b}{2}}^{\frac{b}{2}} cy(y) dy \quad S = 7$$

$$AR := \frac{b^2}{S} = 7$$



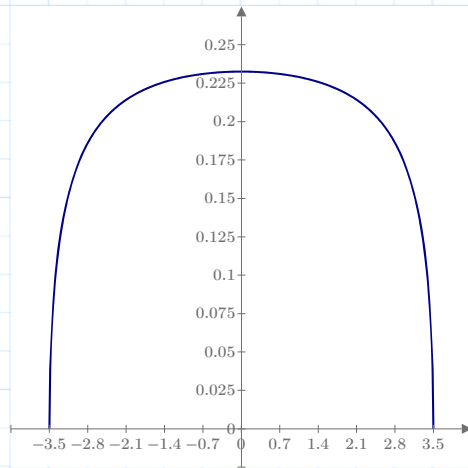
$$a(m, n) := \sin(n \cdot \theta(m)) + \frac{c(\theta(m))}{4 \cdot b} \cdot Cla \cdot n \cdot \frac{\sin(n \cdot \theta(m))}{\sin(\theta(m))} \quad aoa := \frac{5}{57.3}$$

$$r(m) := \frac{c(\theta(m))}{4 \cdot b} \cdot Cla \cdot (aoa + aaero(\theta(m)))$$

$$i := 1 \dots N \quad j := 1 \dots N$$

$$aa_{i,j} := a(i, j) \quad rr_j := r(j) \quad A := aa^{-1} \cdot rr$$

$$\Gamma a(x) := 2 \cdot b \cdot \sum_{k=1}^N A_k \cdot \sin\left(k \cdot \arccos\left(2 \cdot \frac{x}{b}\right)\right)$$



$$A = \begin{bmatrix} 0.019 \\ -1.817 \cdot 10^{-18} \\ 0.002 \\ -1.435 \cdot 10^{-18} \\ 5.612 \cdot 10^{-4} \\ 3.669 \cdot 10^{-19} \\ 1.679 \cdot 10^{-4} \\ -4.846 \cdot 10^{-19} \\ 6.257 \cdot 10^{-5} \\ -1.266 \cdot 10^{-19} \\ 2.769 \cdot 10^{-5} \\ 3.562 \cdot 10^{-19} \\ \vdots \end{bmatrix}$$

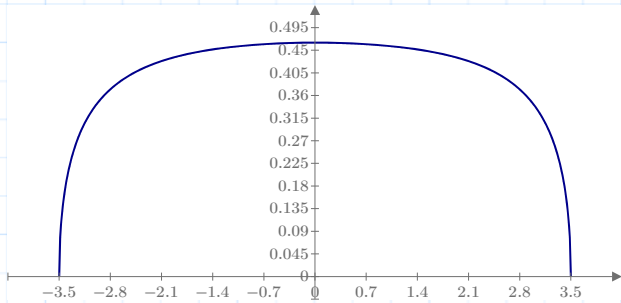
x

Γa(x)

$$CL := \pi \cdot \frac{b^2}{S} \cdot A_1 \quad CL = 0.41$$

$$CD := \pi \cdot AR \cdot \sum_{k=1}^N A_k^2 \quad CD = 0.008$$

Sectional Lift Coefficient



$$2 \cdot \frac{\Gamma a(y)}{c y(y)}$$

y