

At maximum available power, an electric motor/propeller combination is measured to have a thrust of $T = 1.5$ N. An electric aircraft which is to use this powerplant has the following characteristics:

$$\begin{aligned}W &= 3 \text{ N} \\S &= 0.30 \text{ m}^2 \\CDA_o &= 0.005 \text{ m}^2 \\c_d &= 0.02 \\b &= 1.8 \text{ m} \\e &= 0.95 \\c_{\ell_{\max}} &= 0.8\end{aligned}$$

The aircraft operates at air density $\rho = 1.2 \text{ kg/m}^3$.

- a) Determine the minimum sustainable flight speed V_{\min} .
- b) Determine $D_o(V)$, $D_p(V)$, $D_i(V)$, and the total $D(V)$. Plot all four curves on the same plot, from $V = V_{\min}$ to $V = 20 \text{ m/s}$. Also overlay the constant T on this plot.
- c) Determine the maximum flight speed V_{\max} of the aircraft. Determine the corresponding flight C_L at this speed.