Disk Loading Computation:

$$\Delta = \frac{mg}{A} = \frac{mg}{\pi (b\cos\theta)^2}$$

$\left.\begin{array}{l} m = 0.4g = .0004 kg \\ g = 9.81 m/s^2 \\ b = 61.12 mm = .06112 m \\ \theta = 0.7° \end{array}\right\}$

$$\Delta = \frac{.0004 \cdot 9.81}{\pi (.06112 \cdot \cos(.7))^2} = \cancel{3.34} \; \frac{.0334}{1} \frac{N}{m^2}$$
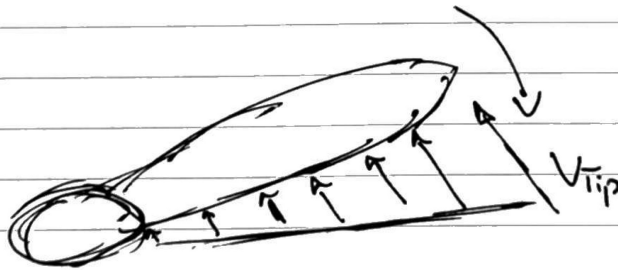
Dynamic Pressure

$$\tfrac{1}{2}\rho V^2, \quad V = \sqrt{V_d^2 + V_T^2}$$

$V_d = .09 \, m/s$

$V_T = \omega \cdot b \rightarrow \omega \cdot b\cos\theta$?

$\quad = 80 RPS \cdot .06112 m$

$\quad = 4.89 \, m/s \; ; \; \theta$ is small $\Rightarrow \cos\theta \sim 1$

Average Velocity: $(V_{Tip} + V_{Root}) \cdot \tfrac{1}{2} = 2.448 \, m/s$

$$V = \sqrt{.09^2 + .2448^2}$$
$$= 2.449 \, m/s$$

$$P_{Dynamic} = \tfrac{1}{2} \cdot (1.225 \, kg/m^3) \cdot (2.449 \, m/s)^2 = 3.674 \, \frac{kg \cdot m}{m^2 s^2}$$

$$P_{dynamic} = 3.674 \; \frac{kg \, m}{s^2} \cdot \frac{1}{m^2} = 3.674 \; \frac{N}{m^2}$$

$$\frac{1}{C_L} = \frac{P_{dynamic}}{\Delta} \Rightarrow C_L = \frac{\Delta}{P_{dynamic}}$$

$$= 3.34 \; N \cdot \frac{1}{m^2} \cdot \frac{m^2}{3.674 \; N}$$

$$= 0.91 \; .091$$

$$= .0334 \; \frac{N}{m^2} \cdot \frac{1}{3.674} \; \frac{m^2}{N}$$

$$= .091$$

$$\frac{v_1 - v_0}{0.2} = 9.81$$