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Homework 1

Method

Given the equations for lift and drag, in order to determine the speed at the maximum L/D, I must first determine the expression for the maximum L/D. I assumed the maximum value of L/D would occur at the point at which the derivative of L/D with respect to velocity (V) was equal to zero. This would allow me to determine the velocity V^* which would maximize L/D. Since lift equals weight in this case (L = W), I found the following expression for V*:

$$V^* = \sqrt[4]{\frac{8W^2}{25S^2\rho^2 C_{D0}}}$$

Results

The velocity V^* which maximizes L/D for the B-52 Stratofortress is equal to **V* = 695.087 ft/s**. The following figure shows L/D plotted against airspeed, with V* indicated:

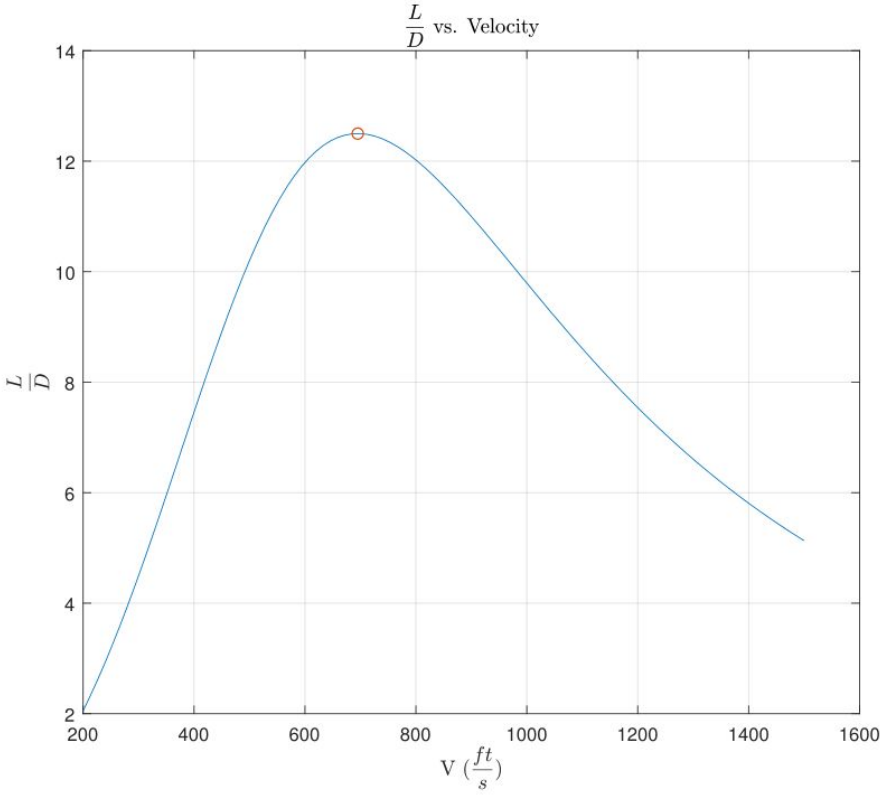

Figure 1: L/D versus airspeed of the B-52 Stratofortress

Discussion

The results above match the expected values because the expression of V* is derived from the derivative of L/D with respect to V, which will maximize L/D. If the L/D curve had multiple local minima/maxima we would have to go further to confirm the value of V which would maximize L/D.