Drag Measurements on a Laminar-Flow Body of Revolution

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Abstract

A laminar-flow body of revolution was placed in a wind tunnel under a Reynolds number range per unit body length of $2 \times 10^5 \leq Re_L \leq 2 \times 10^6$ ft^{-1} where Re_L is defined as

$$Re_L = \frac{V}{\nu}. \tag{1}$$

The body of revolution was created in such a way as to achieve extended runs of laminar flow but also with minimal separation. This streamlining procedure resulted in minimized drag coefficients for wide ranges of Reynolds numbers. The drag coefficient C_D was measured for different Reynolds numbers, and liquid crystals were used to monitor the separation points. There were simulations run with both free transition points and fixed transition points at $x/L = 0.17$ and 0.50. I will attempt to recreate the laminar-flow body and compare the drag coefficients I measure with the ones recorded in the report. I will compare free transition and fixed transition drag coefficients in order to validate my findings with the recorded values.