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Reynolds Number Needed to Determine the von Kármán Constant RONALD PANTON, University of Texas — New precise measurement of velocity profiles and independent measurements of wall shear stress have allowed researchers to determine better values of the von Kármán constant, κ. The constant appears in the common part of the inner and outer velocity profiles; the log law. As the Reynolds number becomes high, the common part may be explicitly measured in the velocity profile. The question is how high does Re^* need to be before measurement will yield accurate values of the von Kármán constant. The answer is different for pipe flow, channel flow, boundary layers. A model of the inner flow velocity profile and Coles' wake function are combined in a composite expansion. For a given flow (wake parameter Π and Re^* one can compute the "Log Law Diagnostic" function; $\gamma \equiv y+ \; d \; u+ \; / \; d \; y+$ and determine if $1 \; / \; \gamma$ becomes, for any $y+$, equal to the von Kármán constant. At low values of Re^* the inner and outer functions interact so strongly that $1 \; / \; \gamma$ is never equal to κu From a sequence of calculations one can determine the lowest Reynolds number for which κ can be determined. The results depend on the wake parameter of the flow. At any Reynolds number one can determine the range of $y+$ values for which the log law should be observed. Of course, the calculated results are dependent on the assumed model. Although precise values are not accurate, they are useful as rough estimates and their trends with Re^* and Π are to be expected.

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