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An Assessment of Oil Film Interferometry to Measure Skin Friction PETER A. MONKEWITZ, EPFL, Lausanne, Switzerland, ANTONIO SEGALINI, JEAN-DANIEL RÜEDI, Univ. Bologna, Forli, Italy — In recent years, the independent measurement of wall shear stress with oil film interferometry has led to a step increase in the understanding of turbulent boundary layers. However, while many arguments depend critically on a precise knowledge of the skin friction, the systematic errors of the oil film technique are not well known. In particular the basic theory underlying the technique has essentially not evolved since it was first proposed by Tanner & Blows (J. Phys. E: Sci. Instrum., vol. 9, 1976, p. 194). The purpose of this study is to elucidate the dominant systematic error of the classical oil film method. We derive the corrections to the basic Tanner & Blows similarity solution for the film development in zero pressure gradient boundary layers and validate the analysis experimentally. This allows to formulate “best practice guidelines” for the oil film technique that help push uncertainties below 1%.

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