Adverse-Pressure-Gradient effects on Turbulent Boundary Layers

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Wall-bounded turbulence is present in many relevant fluid-flow problems such as the flow around wings, land and sea vehicles, or in turbines, compressors, etc. Simplified scenarios, such as the zero-pressure-gradient (ZPG) turbulent boundary layers (TBL) developing over a flat plate, have been deeply investigated in the past. Unfortunately, TBL seldom develop under ZPG conditions, with pressure gradients having significant impact on their features. In particular, adverse pressure gradients (APG) might produce flow separation with the consequent losses in performances. In this talk a unique experimental database of APG TBL covering a wide range of Reynolds numbers and with different pressure-gradient histories is presented. The measurements were performed by means of hot-wire anemometry (HWA) and oil-film interferometry (OFI) in the Reynolds-number range , and for pressure-gradient intensities resulting in values of the Clauser pressure-gradient parameter in the range . The primary objective is to study and compare near-equilibrium and non-equilibrium APG TBLs developing on a flat plate, discerning Reynolds-number effects from those due to the pressure-gradient.

Biography

Stefano Discetti received his BSc (2007), MSc (2009), and PhD (2013) in aerospace engineering from the University of Naples Federico II. His PhD thesis focused on the development of tomographic PIV and its application to turbulent flows. As a part of his PhD studies, in 2010 and 2012 he worked in the Laboratory for Energetic Flow and Turbulence at Arizona State University on the development of 3D particle image velocimetry for the investigation of the turbulence generated by fractal grids. After receiving his PhD, he joined the Department of Bioengineering and Aerospace Engineering at Universidad Carlos III de Madrid where he currently holds the position of Profesor Titular de Universidad. His current research interests include the development of non-intrusive measurement techniques, wall-bounded turbulent flows and application of data-mining techniques to thermo-fluid-dynamic problems.