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Effects of Adverse Pressure Gradient and Convex Curvature on the Evolution of Turbulence Statistics and Coherent Structures .[1]
SIMERET GENET, LIUYANG DING, ALEXANDER SMITS, MARCUS HULTMARK , Princeton University — Here we are interested in developing models and scaling relationships that better characterize non-equilibrium, turbulent, wall-bounded flows. In this study, an axisymmetric body is used to introduce streamwise pressure gradients and streamline curvature to a fully developed turbulent flow in a pipe. This body consists of three sections which are the bow, recovery region and the stern. The flow first sees the bow that creates a favorable pressure gradient. It then passes over the recovery region before meeting the stern that introduces an adverse pressure gradient (APG). Particle Image Velocimetry (PIV) is used to measure the flow field. The evolution of turbulent statistics as well as deformations of coherent structures are quantified in the stern region of the body of revolution. Different sized bodies are used to vary the strengths of the APG. Lastly, results from PIV are compared with data obtained from hot wire measurements at high Reynolds numbers in the Superpipe.

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