

Time-resolved Wall Shear Stress Measurements using MEMS

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MEMS (Micro Electro Mechanical Systems) wall mounted hot wire sensors have been developed at the Thermo and Fluid Dynamics department (TFD) at Chalmers University of Technology, and final design and production was performed by the KTH group. The sensors were used to investigate the fluctuations of the velocity within the viscous sublayer of a zero-pressure-gradient turbulent boundary layer flow. The particular aim of the experiments was to increase the accuracy of using MEMS in turbulent flow by incorporating new features such as temperature compensation. The measurements were performed at Reynolds numbers, Re_θ ranging from 1000 to 15000. The relative intensity of the streamwise wall shear stress fluctuations was the property of primary interest and the results achieved were compared to other relevant, reliable data collected from literature. From this study the limiting value of turbulence intensity at the wall was found to range between 0.3 and 0.5 with an appropriate approximation being the 0.4 value that is quoted in most literature.

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