UNIVERSITÄT BAYREUTH

TECHNISCHE MECHANIK UND STRÖMUNGSMECHANIK TMS

Student assistantship position

Investigation of flow properties in turbulent pipe flows

Chair for Applied Mechanics and Fluid Dynamics, Universität Bayreuth

Description For almost a century, wall bounded turbulent shear flows have been regarded as an attractive topic for physicists, mathematicians and engineers and have inspired wide ranges of studies. In most practical and industrial applications, the Reynolds number acquires very high values. This fact leads to large energy losses which are caused by turbulence dissipation. Therefore, detailed study of this phenomenon results in realistic prediction of losses, efficient flow control and reduction of energy consumption. The present research focuses on fully developed turbulent pipe flow at intermediate Reynolds numbers due to its scientific and industrial relevance.

Objective Structures and scaling of turbulent flow properties will be investigated using data from Direct Numerical Simulations (DNS) which have been carried out at three Reynolds numbers for pipe length of 50 radii. For this purpose, statistical turbulence properties, one and two dimensional energy spectra, velocity correlations and turbulent kinetic energy budgets are some of the main topics that will be investigated. The results will be also analysed in a comparative study against existing experimental results.

Requirements A good Knowledge of fluid dynamics, numerical analysis and intermediate programming skills are required. Prior programming experience in `Matlab` and `Fortran` will be highly helpful.

Duration The position is planned for 6 months with 20 working hours per week.

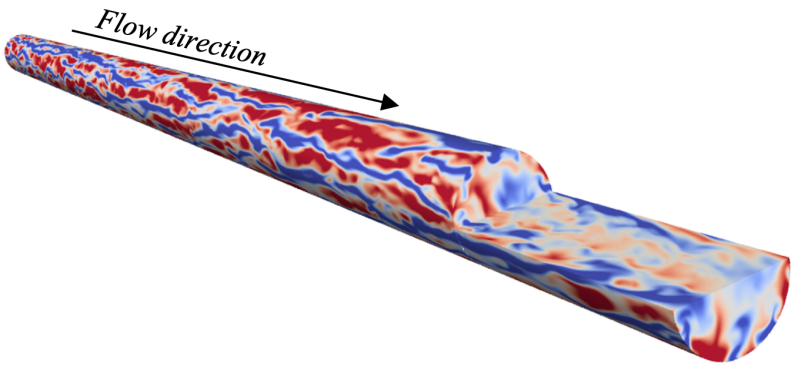

Figure 1: Contours of streamwise velocity perturbations normalised by bulk velocity at $Re_b = 5300$. Red and blue correspond respectively to ± 0.2. The entire pipe has been cut in the azimuthal and streamwise directions at radial distance of $r/R = 0.9$ to visualise the near wall structures.

Contacts

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