

# Recent Studies in Coherent Structures in Turbulent Pipe Flow

Dipl.-Ing. Emir Öngüner

For linear stable shear flows, turbulent pipe flow has been investigated for different Re-numbers. Turbulence can be achieved in natural or artificial methods. For transitions some perturbations are needed to trigger turbulence and some structures as puffs and slugs can be observed. In last decades the so called largescale motions (LSM), which are composed of detached eddies with wide range of azimuthal scales in the outer layer, are identified. Advanced versions of LSMs, the very large-scale motions (VLSM), have radial scales. The VLSMs are concentrated around a single azimuthal mode and make a smaller angle with the wall compared to the LSM.

These above mentioned phenomena will be investigated at high Reynolds numbers in the pipe facility Cottbus-Large Pipe at BTU Cottbus-Senftenberg (CoLa-Pipe) which provides a bulk Reynolds number of  $Re_m < 1;5 \times 10^6$ . Previous studies at the Department of Aerodynamics and Fluid Mechanics-BTU provide an outline for conditions of fully developed turbulent flow state with natural as well as artificial transition. Considering these fully developed flow conditions at CoLa-Pipe, next investigations will be primarily focused on the structures in boundary layer in terms of LSM and VLSM by using hot wire anemometry and PIV. The main aim of this work will be analysing the lengths of structures at high Re-numbers in terms of their wavelengths and comparing with those of low Re-numbers regions.