that plays a central role in the multi-stage transition between the onset of DR and MDR. Specifically, we have observed that in the low drag reduction (LDR) regime this region is confined to 100 wall units from the wall, while in high drag reduction (HDR) and MDR regimes this region is enlarged to 200 or more wall units.

cfli@ujs.edu.cn

11:20–207

Relaminarization of wall turbulence by high-pressure ramps at low Reynolds numbers

Kwonyul Song, Jovan Jovanović*,†, Ahmed Al-Salaymeh**, Cornelia Rauh*, Antonio Delgado**

**Institute of Fluid Mechanics, Technical Faculty, Friedrich-Alexander University Erlangen-Nuremberg, Cauerstrasse, Erlangen, Germany*

***Mechanical Engineering Department, Faculty of Engineering and Technology, University of Jordan, Amman, Jordan*

Reverse transition from the turbulent towards the laminar flow regime was investigated experimentally by progressively increasing the pressure up to 400 Mpa in a fully developed pipe flow operated with silicone oil as the working fluid. Using hot-wire anemometry, it is shown indirectly that at low Reynolds numbers a rapid increase in pressure modifies the turbulence dynamics owing to the processes which induce the effects caused by fluid compressibility in the region very close to the wall. The experimental results confirm that under such circumstances, the traditional mechanics responsible for self-maintenance of turbulence in wall-bounded flows is altered in such way as to lead towards a state in which turbulence can not persist any longer.

jovan.jovanovic@lstm.uni-erlangen.de

11:40–207

Energy and helicity cascades in rotating turbulence

Rodion Stepanov

Institute of Continuous Media Mechanics, Perm, Russia

The cascade processes in homogeneous stationary turbulence simultaneously excited by a helical force and affected by rotation are considered. Numerical simulations at very large Reynolds numbers are performed using the shell model based on decomposition of helicity into eigenmodes. It is shown that the energy spectrum forms two inertial ranges with "-2" and "$-5/3$" slopes. Energy and helicity spectral fluxes keep constant with within these well pronounced inertial ranges. The helicity is transferred as a passive admixture, its dissipation appears at the same scales as the energy, though the helicity transfer dynamics on the inertial range are different on the large and small scales. We reconsider some results about helical rotating turbulence obtained in DNS which may be caused by limited spectral resolution.

rodion@icmm.ru

12:00–207

A non-frozen flow model for pressure space-time correlations in turbulent shear flows

Li Guo, Guowei He†, Xing Zhang

The State Key Laboratory of Nonlinear Mechanics, Institute of Mechanics, Chinese Academy of Sciences, Beijing, China

Pressure space-time correlations are important to turbulence generated noise and flow-induced vibration. In this study, we numerically calculate the pressure space-time correlations in turbulence channel flows, and find that Taylor's frozen-flow hypothesis is a linear approximation to iso-correlation contours. Therefore, we propose a non-frozen flow model for pressure space-time correlations in turbulent shear flows. The model describes the preference direction bending towards the time separation direction using the convection velocity and acceleration. It is consist with space correlation at vanishing time separation. The model is verified by the data from the direct numerical simulation (DNS) of turbulent channel flows. Using the model, the space-time correlations could collapse to the space correlation. However, Taylor's hypothesis fails in making the collapsing. The parameters in the model are calculated from optimization procedure, where the convection velocity and acceleration obtained are very close to the values from their definitions.

hgw@lnm.imech.ac.cn

FM12: Non-Newtonian and complex fluids
09:20–10:20, Friday, 24 August
Radhakrishna Sureshkumar, USA, Chair
Keqin Zhu, China, Chair
Room: 210A

09:20–210A

Dynamics and rheology of micellar fluids from molecular dynamics simulations

Ashish Sangwai, Radhakrishna Sureshkumar*,**,†*

**Department of Biomedical and Chemical Engineering, Syracuse University, Syracuse, USA*

***Department of Physics, Syracuse University, Syracuse, USA*

Coarse grained molecular dynamics (MD) simulations with explicit solvent- and salt-mediated interactions are developed to study the dynamics of cationic cylindrical micelles in shear flow. Single micelle simulations are used to study the effect of shear rate on flow alignment-tumbling cycles, micelle elongation and rupture. Binary interactions and flow-induced micelle coalescence are also studied under different salt concentrations to understand the molecular origin of the shear-thickening behavior seen in micelle solutions.

rsureshk@syr.edu