Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Development of anisotropy in a spanwise rotating channel[1] SEDAT TARDU, JULIEN BAERENZUNG, LEGI, B.P. 53 X, 38041 Grenoble, France — Development of anisotropy in a spanwise rotating channel is analyzed in time and space through direct numerical simulations. The aim is to understand how the anisotropy sets-up both in time and space in a supercritical flow, the role of rotation being rather generic in this particular context. A perturbation in the form of a quasi-streamwise pair of vortices is followed in time and space Several techniques to quantify anisotropy are used such as the trajectories in time and space of the Lumley invariants, the dissipation tensor invariants and local anisotropy characterization in spectral domain. The analysis of the shear stress and dissipation tensors invariants shows that the local perturbations "hesitate" between a 2 component and a rod-like axisymmetric structure near the channel centerline. The return to isotropy in the outer layer takes time with large excursions appearing in the invariants space. There is no such hesitation near the wall,and the excursions take place along 2 component to one component axisymmetric line The local anisotropy is further analyzed by computing the invariants of the amplitude of shear stress Fourier transforms. The invariants of the related spectral tensor is highly intermittent and has a granular structure. A model based on a nonlinear (Duffing) oscillator predicts satisfactorily well the temporal development of the invariants in the outer layer.

[1]We acknowledge financial sport from Agence Nationale de la Recherche (ANR)

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Date submitted: 07 Aug 2010 Electronic form version 1.4