Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Lagrangian statistics in turbulent channel flow: implications for Lagrangian stochastic models[1] NICKOLAS STELZENMULLER, Universit de Grenoble Alpes, LEGI, JUAN IGANCIO POLANCO, IVANA VINKOVIC, Universit Lyon 1, INSA Lyon, Ecole Centrale Lyon, CNRS, LMFA UMR 5509, NICOLAS MORDANT, Universit de Grenoble Alpes, LEGI — Lagrangian acceleration and velocity correlations in statistically one-dimesional turbulence are presented in the context of the development of Lagrangian stochastic models of inhomogeneous turbulent flows. These correlations are measured experimentally by 3D PTV in a high aspect ratio water channel at $Re_\tau = 1450$, and numerically from DNS performed at the same Reynolds number. Lagrangian timescales, key components of Lagrangian stochastic models, are extracted from acceleration and velocity autocorrelations. The evolution of these timescales as a function of distance to the wall is presented, and compared to similar quantities measured in homogeneous isotropic turbulence. A strong dependance of all Lagrangian timescales on wall distance is present across the width of the channel. Significant cross-correlations are observed between the streamwise and wall-normal components of both acceleration and velocity. Lagrangian stochastic models of this flow must therefore retain dependance on the wall-normal coordinate and the components of acceleration and velocity, resulting in significantly more complex models than those used for homogeneous isotropic turbulence.

[1]We gratefully acknowledge funding from the Agence Nationale de la Recherche, LabEx Tec 21, and CONICYT Becas Chile

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Date submitted: 25 Jul 2016 Electronic form version 1.4