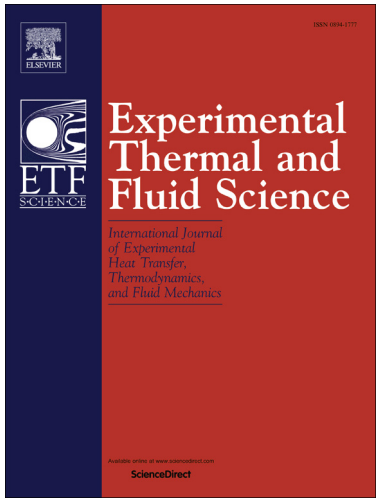

Combining time-resolved multi-point and spatially-resolved measurements for the recovering of very-large-scale motions in high Reynolds number turbulent boundary layer

F. Kerhervé, S. Roux, R. Mathis

PII: S0894-1777(16)30304-1
DOI: http://dx.doi.org/10.1016/j.expthermflusci.2016.10.032
Reference: ETF 8918

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 9 December 2015
Revised Date: 19 September 2016
Accepted Date: 29 October 2016

Please cite this article as: F. Kerhervé, S. Roux, R. Mathis, Combining time-resolved multi-point and spatially-resolved measurements for the recovering of very-large-scale motions in high Reynolds number turbulent boundary layer, *Experimental Thermal and Fluid Science* (2016), doi: http://dx.doi.org/10.1016/j.expthermflusci.2016.10.032

Combining time-resolved multi-point and spatially-resolved measurements for the recovering of very-large-scale motions in high Reynolds number turbulent boundary layer

F. Kerhervé[a,*], S. Roux[b], R. Mathis[c]

[a]*Institut PPRIME, Université de Poitiers - ENSMA, UPR 6609 CNRS (France)*
[b]*Laboratoire de Thermocinétique de Nantes UMR 6607, Nantes (France)*
[c]*Laboratoire de Mécanique de Lille, UMR CNRS 8107 (France)*

Abstract

A methodology to recover very-large-scale motions based on the combination of time-resolved multi-point measurements and spatially-resolved full field information is here presented and applied to a high Reynolds number turbulent boundary layer flow developping over a flat plate. These very-large-scale motions are characterised by a large degree of persistence, both in time and space, and are believed to play an active role in the development of turbulence in the near-wall region Bandyopadhyay and Hussain (1984); Chung and McKeon (2010); Hutchins and Marusic (2007a); Marusic et al. (2010a). Due to the very large streamwise extent of these structures and of their meandering nature, point-measurement techniques or low time-resolved full field techniques such as Particle Image Velocimetry (PIV) offer a limited view when used alone. In the present paper, a time-resolved estimate of the full velocity vector field in a spanswise / wall-normal plane is obtained by combining low-repetition two-dimensional stereo-PIV mea-

*franck.kerherve@univ-poitiers.fr, +33(0)549366062, Corresponding author