# 2nd Multiflow Summer School on Turbulence 2015

Journal of Physics: Conference Series Volume 708

Madrid, Spain 25 May – 26 June 2015

**Editor:** 

**Javier Jimenez** 

ISBN: 978-1-5108-2327-3 ISSN: 1742-6588 Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2015) by the Institute of Physics All rights reserved. The material featured in this book is subject to IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact the Institute of Physics at the address below.

Institute of Physics Dirac House, Temple Back Bristol BS1 6BE UK

Phone: 44 1 17 929 7481 Fax: 44 1 17 920 0979

techtracking@iop.org

#### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400 Fax: 845-758-2633 Email: curran@proceedings.com Web: www.proceedings.com

## **Table of contents**

### Volume 708

2nd Multiflow Summer School on Turbulence 25 May to 26 June 2015, Madrid, Spain

Accepted papers received: 31 March 2016 Published online: 29 April 2016

#### Preface

011001 OPEN ACCESS Second Multiflow Summer School on Turbulence

Javier Jiménez

#### Editorial

011002 OPEN ACCESS Editorial opinion: public dissemination of raw turbulence data

Juan A. Sillero and Javier Jiménez

#### Peer review statement

011003 OPEN ACCESS Peer review statement

#### **Papers**

#### THE ENERGY CASCADE AND REDUCED-ORDER MODELS

012001

OPEN ACCESS

<u>Homogeneous shear turbulence – bypass concept via interplay of linear transient growth</u> <u>and nonlinear transverse cascade</u>

George Mamatsashvili, Siwei Dong, George Khujadze, George Chagelishvili, Javier Jiménez and Holger Foysi pg. 1

012002 OPEN ACCESS A POD-based analysis of turbulence in the reduced nonlinear dynamics system

M-A Nikolaidis, B F Farrell, P J Ioannou, D F Gayme, A Lozano-Durán and J Jiménez pg. 19

012003 OPEN ACCESS <u>Unstable periodic orbits in plane Couette flow with the Smagorinsky model</u>

Eiichi SASAKI, Genta KAWAHARA, Atsushi SEKIMOTO and Javier JIMÉNEZ pg. 33

012004 OPEN ACCESS A new statistical tool to study the geometry of intense vorticity clusters in turbulence

Alberto Vela-Martin and Takashi Ishihara pg. 41

#### WALL-BOUNDED FLOWS

012005 OPEN ACCESS Local topology via the invariants of the velocity gradient tensor within vortex clusters and intense Reynolds stress structures in turbulent channel flow

Abel-John Buchner, Adrián Lozano-Durán, Vassili Kitsios, Callum Atkinson and Julio Soria pg. 47

012006 OPEN ACCESS Identifying coherent structures and vortex clusters in Taylor-Couette turbulence

Vamsi Spandan, Rodolfo Ostilla-Monico, Detlef Lohse and Roberto Verzicco pg. 61

012007 OPEN ACCESS Space and time behaviour of the temperature second-order structure function in Rayleigh-Bénard convection

Riccardo Togni, Andrea Cimarelli, Adrián Lozano-Durán and Elisabetta De Angelis pg. 74

012008 OPEN ACCESS Reynolds Stress Structures in the Hybrid RANS/LES of a Planar Channel

Jack Weatheritt, Richard Sandberg and Adrian Lozano-Durán pg. 84

012009 OPEN ACCESS Geometry-induced fluctuations in the transitionally rough regime

Nabil Abderrahaman-Elena and Ricardo García-Mayoral pg. 99

012010 OPEN ACCESS The minimal channel: a fast and direct method for characterising roughness

Michael MacDonald, Daniel Chung, Nicholas Hutchins, Leon Chan, Andrew Ooi and Ricardo García-Mayoral pg. 111

012011 OPEN ACCESS Analysis and comparison between rough channel and pipe flows

David Sassun, Oscar Flores and Paolo Orlandi pg. 126

#### **COMPLEX FLOWS**

012012 OPEN ACCESS Large-eddy simulations of adverse pressure gradient turbulent boundary layers

Alexandra Bobke, Ricardo Vinuesa, Ramis Örlü and Philipp Schlatter pg. 137

012013 OPEN ACCESS Coherent structures in a zero-pressure-gradient and a strongly decelerated boundary layer

Mark P Simens, Ayse G Gungor and Yvan Maciel pg. 155

012014 OPEN ACCESS On determining characteristic length scales in pressure gradient turbulent boundary layers

Ricardo Vinuesa, Ramis Örlü and Philipp Schlatter pg. 170

012015 OPEN ACCESS Inception and evolution of coherent structures in under-expanded supersonic jets

P.C. Stegeman, J. M. Pérez, J. Soria and V. Theofilis pg. 179