

Contents

Preface	ix
----------------------	----

1 Mathematical issues

<i>C. R. Doering</i> Does turbulence saturate global transport estimates?	3
<i>A. V. Fursikov</i> The closure problem for Friedman-Keller infinite chain of moment equations, corresponding to the Navier-Stokes system	17
<i>J. D. Gibbon</i> Vorticity alignment results for the 3D Euler and Navier-Stokes equations	25
<i>R. B. Pelz, Y. Gulak, J. M. Greene, O. N. Boratav</i> On the finite-time singularity problem in hydrodynamics	33
<i>R. M. Kerr</i> The outer regions in singular Euler	41

2 Control and related

<i>A. V. Fursikov</i> On controllability of the Navier-Stokes equations	51
<i>J. L. Lumley, P. N. Blossey, B. Podvin-Delarue</i> Low dimensional models, the minimal flow unit and control	57
<i>P. J. Ioannou, B. F. Farrell</i> Active control of turbulence in boundary layer flows	67
<i>B. F. Farrell, P. J. Ioannou</i> Origin and growth of structures in boundary layer flows	75
<i>O. Métais, G. Urbin</i> Vortex control in a spatially growing round jet	83

3 Observational aspects

J. G. Brasseur

- The lack of a simple paradigm in fully developed turbulence:
characteristics of local concentrations of vorticity and
Reynolds stress in turbulent shear flows 95

J. C. Vassilicos

- Near-singular flow structure in small-scale turbulence 107

W. K. George

- Some thoughts on similarity, the POD, and finite boundaries 117

F. Belin, F. Moisy, P. Tabeling, H. Willaime

- Worms in a turbulence experiment, from hot wire time series 129

J.-F. Pinton, F. Chillá, S. Fauve, R. Labbé

- Intermittency in the closed flow between coaxial disks 141

4 Two- and quasi-two-dimensional flows

H. Aref, P. L. Boyland, M. A. Stremler, D. L. Vainchtein

- Turbulent statistical dynamics of a system of point vortices 151

M. Farge, N. Kevlahan, C. Bardos, K. Schneider

- Combining deterministic and statistical approaches to compute
two-dimensional turbulent flows with walls 163

J. R. Herring, Y. Kimura, J. Chasnov

- Evolution of decaying two-dimensional turbulence and
self-similarity 175

C. Cambon

- Linear and nonlinear models for turbulence in
the presence of waves 185

P. Caillol, V. Zeitlin

- On the stationary energy spectra of the stratified fluid in a
weak turbulence regime 195

F. Dupont, R. I. McLachlan, V. Zeitlin

- On a possible mechanism of anomalous diffusion in
geophysical turbulence 203

5 Basic aspects of turbulence modelling

<i>M. Germano</i>	
Basic issues of turbulence modeling	213
<i>C. Meneveau, J. O'Neil, F. Porte-Agel, S. Cerutti, M. B. Parlange</i>	
Physics and modeling of small scale turbulence for large eddy simulation	221
<i>D. Rempfer</i>	
On dynamical systems obtained via Galerkin projections onto low-dimensional bases of eigenfunctions	233
<i>M. Oberlack</i>	
Symmetries of the Navier-Stokes equations and their implications for subgrid-models in large-eddy simulation of turbulence	247
<i>A. Leonard</i>	
Subgrid modeling for the filtered scalar transport equation	257

6 Statistical aspects

<i>G. L. Eyink</i>	
Turbulent fluctuations, predictability, and action principles	267
<i>V. Lebedev</i>	
Instantons in the theory of turbulence	277
<i>E. A. Novikov, D. G. Dommermuth</i>	
A variational approach to turbulent boundary layers	303
<i>S. Ciliberto, E. Leveque, C. Baudet, G. Ruiz-Chavarria</i>	
Scaling laws of a passive scalar energy flux in fully developed turbulence	307
<i>F. Toschi, G. Amati, R. Piva, S. Succi, R. Benzi</i>	
Intermittency in channel-flow turbulence	313
<i>P. Orlandi, R. A. Antonia, P. G. Esposito</i>	
Structure functions in homogeneous and non-homogeneous turbulent flows	319
<i>O. Métais, E. Lamballais, M. Lesieur</i>	
Pressure fluctuations in a turbulent channel	329
<i>W. van de Water</i>	
Statistics of longitudinal and transverse velocity increments	337
<i>A. Pumir, L. Blumenfeld</i>	
Turbulent transport in a liquid layer heated on its free surface	347

<i>Ch. Renner, B. Reisner, St. Lück, J. Peinke, R. Friedrich</i> On the statistics of small-scale turbulence and its universality	353
<i>B. Reisner, Ch. Renner, St. Lück, J. Peinke, F. Chillá, R. Friedrich</i> A new method to characterize inhomogeneous turbulence	361
<i>M. J. Huang</i> Multiscale similarity of isotropic homogeneous turbulence	365
 7 Passive objects	
<i>E. Ott</i> The role of Lagrangian chaos in the creation of multifractal measures	381
<i>P. E. Dimotakis, H. J. Catrakis, A. W. Cook, J. M. Patton</i> On the geometry of two-dimensional slices of irregular level sets in turbulent flows	405
<i>G. Falkovich</i> Universal and nonuniversal properties of the passive scalar statistics	419
<i>P. K. Yeung</i> Multi-scalar mixing and Lagrangian approaches	427
<i>N. Kleeorin, I. Rogachevskii</i> Turbulent transport of vector (magnetic) field: intermittency and anomalous scalings	435
<i>T. Elperin, N. Kleeorin, I. Rogachevskii</i> Intermittency and anomalous scalings of inertial particles distribution in turbulent flow	445
<i>E. Villiermaux, C. Innocenti, J. Duplat</i> Scalar fluctuation PDF's and kinetics of turbulent mixing	457
<i>J.-F. Pinton, P. Odier, S. Fauve</i> Magnetohydrodynamics in turbulent swirling flow	467
 List of participants and authors	471