Turbulent Shear Flows



Selected Papers from the Third International Symposium on Turbulent Shear Flows

Editors: L.J.S.Bradbury F.Durst B.E.Launder F.W.Schmidt J.H.Whitelaw



Springer-Verlag Berlin Heidelberg New York

Turbulent Shear Flows 3

Selected Papers from the Third International Symposium on Turbulent Shear Flows, The University of California, Davis, September 9–11, 1981

Editors:

L. J. S. Bradbury F. Durst B. E. Launder F. W. Schmidt J. H. Whitelaw

With 244 Figures

Springer-Verlag Berlin Heidelberg New York 1982

Contents

162269 INSTITUT FUR METEOROLOGIE U. KLIMATOLOGIE UNIVERSITAT HANNOVER HERRENHAUSER STR. 2 - 3000 HANNOVER 21

Part I Wall Flows

| Introductory Remarks. By H. Eckelmann | 3 |
|--|-----|
| Measurements of the Periodic Velocity Oscillations Near the Wall in Unsteady Turbulent Channel Flow. By G. Binder and J.L. Kueny (With 9 Figures) | 6 |
| A Dynamical and Visual Study on the Oscillatory Turbulent Boundary Layer By T. Hayashi and M. Ohashi (With 19 Figures) | 18 |
| Dynamics of an Unsteady Turbulent Boundary Layer. By P.G. Parikh, R. Jayaraman, and W.C. Reynolds (With 14 Figures) | 34 |
| Influence of Strouhal Number on the Structure of Flat Plate Turbulent Boundary Layer. By J. Cousteix, J. Javelle, and R. Houdeville (With 10 Figures) | 46 |
| A Theoretical Model of the Coherent Structure of the Turbulent Boundary Layer in Zero Pressure Gradient By Z. Zhang and G.M.Lilley (With 8 Figures) | 60 |
| The Mechanism of Turbulent Mass Transfer at a Boundary By J.A. Campbell and T.J. Hanratty (With 6 Figures) | 73 |
| Measurements in the Heated Turbulent Boundary Layer on a Mildly Curved Convex Surface. By M.M. Gibson, C.A. Verriopoulos, and Y. Nagano (With 9 Figures) | 80 |
| Part II Scalar Transport | |
| Introductory Remarks. By. K.N.C. Bray | 93 |
| A Test of Gradient Transport and Its Generalizations By K.R. Sreenivasan, S. Tavoularis, and S. Corrsin (With 13 Figures) | 96 |
| Calculations of Velocity-Scalar Joint pdf's. By S.B. Pope (With 8 Figures) | 113 |
| Aerosol Formation in a Mixing Layer By S.V. Sherikar and R. Chevray (With 6 Figures) | 124 |
| The Role of Coherent Structures in the Development of a Uniformly Strained Turbulent Wake. By J.G. Kawall and J.F. Keffer (With 18 Figures) | 132 |
| Investigations on a Reaction Model for Turbulent Diffusion Flames By H. Eickhoff and K. Grethe (With 8 Figures) | 146 |

VII

Part III Recirculating Flows

| Introductory Remarks. By I.P. Castro | 157 |
|---|-----|
| Low Frequency Unsteadiness of a Reattaching Turbulent Shear Layer By J.K. Eaton and J.P. Johnston (With 6 Figures) | 162 |
| Turbulent Shear Flow Behind Hemisphere-Cylinder Placed on Ground PlaneBy S. Okamoto (With 35 Figures) | 171 |
| Experimental Investigations in Transonic Highly Separated, Turbulent Flow By A. Fracy, V. Mercier, and R. Leblanc (With 9 Figures) | 186 |
| Turbulent Flow Induced by a Jet in a Cavity-Measurements and 3D Numerical Simulation. By F. Baron, J.P. Benque, and Y. Coëffé (With 6 Figures) | 195 |
| The Assessment of Numerical Diffusion in Upwind Difference Calculations of Turbulent Recirculating Flows By J.J. McGuirk, A.M.K.P. Taylor, and J.H. Whitelaw (With 9 Figures) | 206 |
| Turbulent and Mean Flow Measurements in an Incompressible Axisymmetric Boundary Layer with Incipient SeparationBy P. Dengel, H.H. Fernholz, and JD. Vagt (With 13 Figures) | 225 |
| Part IV Fundamentals | |

| Introductory Remarks. By J. Lumley 239 |
|--|
| Pressure Effects on Triple Correlations in Turbulent Convective Flows By JC. André, P. Lacarrère, and K. Traoré (With 4 Figures) 243 |
| A Model of Three-Dimensional Transfer in Non-Isotropic Homogeneous Turbulence. By JP. Bertoglio (With 11 Figures) |
| A Theoretical Study of Radiative Cooling in Homogeneous and Isotropic Turbulence. By D. Schertzer and O. Simonin (With 6 Figures) |
| Second Order Closure for Variable Density Free Shear Layer By D. Vandromme and W. Kollmann (With 6 Figures) |
| The Turbulence Modelling of Variable Density Flows – A Mixed-Weighted Decomposition. By H. Ha Minh, B.E. Launder, and J. MacInnes (With 4 Figures) 291 |
| Direct Simulation of Homogeneous Turbulent Shear Flows on the Illiac IV Computer: Applications to Compressible and Incompressible Modelling By W.J. Feiereisen, E. Shirani, J.H. Ferziger, and W.C. Reynolds (With 7 Figures) |
| Index of Contributors |