

Fluid Dynamics in Turbulent Regime

(Dinamica Fluidelor in regim Turbulent)

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(in Romanian)

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This book is a work of three distinguished professors and researchers from the Chair of Aerospace Sciences “Elie Carafoli” of “POLITEHNICA” University of Bucharest, Romania. It continues the contributions of many previous books dedicated to Fluid Dynamics.

Professor Virgiliu N. Constantinescu, member of the Romanian Academy, is a pioneer and leader scientist in gas lubrication. Professor Stelian Galetuse is one of professor Constantinescu co-workers in this field.

Professor Sterian Danaila, now head of Chair of Aerospace Sciences “Elie Carafoli”, has significant contributions to the theory of turbulent boundary layers.

The book of 570 pages includes 9 Chapters and a large Bibliography.

The first Chapter “Introductory Considerations of the Physics of Turbulence” gives a comprehensive insight of this complex and attractive phenomenon – turbulence, very important for applications as well.

The main properties of turbulence are clearly described; then the turbulent scales are defined. Classical examples of turbulent flows are given.

Chapter 2, “The Navier – Stokes Equations” presents various formulations of the Navier – Stokes equations useful for the study of turbulence. Some mathematical properties as non-linearity, symmetries, the existence and the uniqueness of the solution and the boundary conditions are discussed in the perspective of the integration of Navier – Stokes equations.

The third Chapter deals with the statistic description of turbulence. Both incompressible and compressible flows are considered. Different kinds of useful equations are introduced: kinetic energy equations, transport equations of Reynolds stress, transport equations for temperature fluctuations etc.

Chapter 4 is dedicated to spectral analysis of turbulence. Topics like Fourier transform, Navier – Stokes equations in the spectral space, Kolmogorov theory of turbulence and modeling the energy spectrum make the chapter of large interest.

The free shear flows, very important for applications, are included in Chapter 5. The two-dimensional and the axial-symmetric jets, the RD mixing layer and the two-dimensional wake are treated in a very convincing way.

Chapter 6 concerns with flows in channels and ducts, whereas the Chapter 7 approaches the 2D boundary layer, where the authors have significant contributions.

One of the fields where the authors are leading scientists is the hydrodynamics lubrication, treated in Chapter 8. Here as well as in Chapter 9, many extensions of the turbulent lubrication are introduced.

The analysis of the flows at large and very large Reynolds numbers characterized by important fluctuations of velocities, pressure and temperature comes to complete the understanding of turbulent regime problems.

The Bibliography is well selected and comprehensive.

It is an outstanding book very useful to researchers and students in Fluid Dynamics.

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