

REVIEW

Sciences of Turbulent Phenomena (in Japanese). Edited by T. TATSUMI. University of Tokyo Press, 1986. 660 pp. ¥ 13000.

Recent Studies on Turbulent Phenomena (in English). Edited by T. TATSUMI, H. MARUO and H. TAKAMI. Association for Science Documents Information, Oh-okayama 12-1, Meguro-ku, Tokyo 152, 1985. 296 pp. ¥ 6800.

It is certainly unusual to review a book written in Japanese, which the majority of *JFM* readers cannot understand. I believe nevertheless that the first of these two books is such an authoritative and definitive work that its existence, at least, should be brought to the attention of the outside world, with a hope of its translation into English sometime soon.

High-level and intensive research in fluid dynamics in Japan, particularly in the field of turbulence and boundary layers, has perhaps become known through occasional publications in *JFM* and presentations at international meetings. For three years, 1981–3, a nationwide cooperative research project, ‘The investigation and control of turbulent phenomena’, has been carried out in Japan under the sponsorship of the Ministry of Education, Science and Culture. This project has vastly improved their research activities in the field of concern. In commemoration of the ending of the research project, the research workers in question have launched the publication of a comprehensive account of their achievements. The chapter headings and the authors of the first book are listed below:

- I. Introduction (T. Tatsumi, 13 pp.)
- II. Flow instability and nonlinear behaviour of disturbances (K. Gotoh, 33)
- III. Nonlinear waves (N. Yajima, 36)
- IV. Generation of chaos and its mechanism (Y. Kuramoto, 38)
- V. Critical phenomena of chaos and their statistical properties (H. Mori and H. Okamoto, 44)
- VI. Statistical theory of turbulence (T. Tatsumi, 58)
- VII. Dynamics of vortex motion (H. Hasimoto, 44)
- VIII. Numerical analysis of turbulent flows (H. Takami, 30)
- IX. Laminar–turbulent transition (H. Sato, 36)
- X. Formation and breakdown of vortices (T. Matsui, 36)
- XI. Shear flow turbulence (Y. Kobashi and H. Maruo, 78)
- XII. Turbulent flows and sound (F. Sakao and T. Kambe, 28)
- XIII. Stratified turbulent flows (F. Ogino, 32)
- XIV. Turbulence in rivers and oscillating flows (T. Hayashi and M. Hino, 54)
- XV. Large-scale turbulence in atmosphere (R. Kimura, 20)
- XVI. Turbulence in atmospheric boundary layer (R. Yamamoto and O. Tsukamoto, 24)
- XVII. Turbulence in ocean surface layer (Y. Toba, 22)
- XVIII. Experimental techniques (H. Komoda, 26)

The book was intended to be a final report of the project, and actually it gives a lively account of the impressive progress made by each author and the group he coordinated. Some chapters, moreover, include a thorough and comprehensive introduction as well as an up-to-date survey of their subjects. It is, therefore, not the

kind of book to be kept on a library shelf as a mere report or an occasional reference, but is to be read and learnt from with rewarding benefit.

At the end of the cooperative research project, the authors organized an open symposium to report their activities. Nineteen of the reports presented there have been published in English as the second book under review. Except for a few overlappings, the authors and contents are quite different in scope and presentation from the Japanese version, each article being a rather straightforward research report. The contents of the second book are as follows:

General

S. Taneda, Flow visualization

Analytical Approach

T. Kawahara and S. Toh, Nonlinear dispersive waves in unstable dissipative systems

H. Hasimoto, Several aspects of the motion of vortex filaments

T. Tatsumi and M. Yamada, Turbulence and vortex motion

Y. Kaneda, Attempts at statistical theories of turbulence

T. Kamada, Mapping approach to the dissipative dynamical systems

Y. Takahashi, One dimensional maps and the power spectrum

Numerical Approach

T. Kawamura, Direct simulation of flows at high Reynolds number using a third-order upwind scheme

K. Horiuti, Numerical simulation of turbulent plane channel flow

S. Yoden, A numerical study on bifurcation properties of some low-order models in geophysical fluid dynamics

Laboratory Experiments

S. Uchida and Y. Nakamura, Stability and breakdown of vortex flow

H. Yosinobu and S. Wakitani, Transition to turbulence in a natural convection plume above a horizontal line heat source

M. Nishioka, Laminar-turbulent transition in plane Poiseuille flow

H. Komoda, An equipment and methods for real-time data processing in conditional sampling technique

Y. Kobashi, Coherent structure of a turbulent boundary layer

Natural Phenomena

H. Ishizaki and J. Katsura, A fundamental study on turbulence effects on buildings

T. Hayashi, M. Ohashi and Y. Kotani, River flow turbulence and longitudinal vortices

R. Yamamoto and O. Tsukamoto, Turbulence in the atmospheric boundary layer - generation and maintenance of turbulent kinetic energy

Y. Toba, Wind waves and turbulence

This book offers English-speaking readers an excellent opportunity of becoming acquainted with current Japanese research in turbulence.

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