

its maintenance receives a thorough treatment which brings the reader with a minimum of difficulty right to the frontiers of our knowledge of what is probably the most fascinating of all meteorological problems. On the other hand, smaller-scale phenomena such as sea-breezes are given a somewhat cursory treatment, and mountain waves are not mentioned at all, even though they have received much attention in recent years. Convection is discussed in more detail, but the impression given that a convection current behaves dynamically like a rising balloon subjected to viscous drag is misleading, since an isolated convection element is now known to be a rising vortex ring. The author's derivation of the equations of motion of the atmosphere is somewhat novel and will appeal to many, but may not satisfy those who are mathematically inclined. A more rigorous derivation, preferably using vectors, could well be appended.

These criticisms of detail must not be allowed to detract from the overall good quality of this book. The author's style is lucid and his presentation of some concepts, such as inertial stability and the vorticity equation, is particularly attractive. The examples at the end of each chapter are well designed and will help the student to acquire a knowledge of the factors which are of primary importance in the many and varied physical problems encountered in meteorology.

ROBERT P. PEARCE

## INCOMPRESSIBLE AERODYNAMICS

### Incompressible Aerodynamics

An Account of the Theory and Observation of the Steady Flow of Incompressible Fluid past Aerofoils, Wings, and other Bodies. Edited by Bryan Thwaites. (Fluid Motion Memoirs.) Pp. xx+636. (Oxford: Clarendon Press; London: Oxford University Press, 1960.) 75s. net.

**T**HIS book is the first of a new series of Memoirs on Fluid Motion which will also include volumes on laminar boundary layers and turbulence. It addresses itself to a class of problems which have been pushed off the centre of the aerodynamics stage by the current fashion for magnetogasdynamics, hypersonic, rarefied flows and all the other exotic fields associated with space flight or long-range rocketry—namely, the many non-linear problems of incompressible aerodynamics.

Nevertheless, these more old-fashioned problems of low-speed flight are neither irrelevant nor by any means solved or even fully understood, and the present volume is a welcome addition to the library of those in the aeronautical profession who are still concerned with aircraft which must take off, manoeuvre and land with a reasonable degree of effectiveness and reliability; nor will it be found trivial by those many lovers of fluid mechanics who are fascinated by rotational and separated flow-patterns.

The basic thread which runs through this book is the subtle interplay of models of flow patterns suggested by ingenious experiments (both detailed measurements of pressures and visualization of flow fields by means of smoke, tufts and other devices) and approximate analytical techniques designed to fit the observed flow patterns into the fabric of classical aerodynamics. Never is the model oversimplified to make it amenable to analysis; never is mathematics pursued for its own sake to a sophistica-

tion beyond that of the physical picture. At all times, the relevance of the questions and of the answers to the design of more effective machines is clearly kept in mind.

Among the sections which I have found of particular interest, those which deal with stalling wings, separated flows over swept wings and thick wakes, appear outstanding; but this judgment is most likely a reflexion of my tastes. The treatment of almost all the difficult low-speed flight problems by ingenious methods is fascinating and a worthy monument to the men, largely at the National Physical Laboratory and the Royal Aircraft Establishment, who created a distinctive English style in aerodynamics, compounded of sound technique, balanced judgment and a profound intuitive feeling for the physics of fluid flow problems.

LEON TRILLING

## INFRA-RED ARTS

### Infrared Methods

Principles and Applications. By G. K. T. Conn and D. G. Avery. (Physical Chemistry: a Series of Monographs, Vol. 7.) Pp. viii+203. (New York: Academic Press, Inc.; London: Academic Press Inc. (London), Ltd., 1960.) 6.80 dollars

**A**SPECTACULAR change in the attitude of chemists over the past twenty years has been their acceptance of physical methods for solving problems, particularly in organic structural work and in analysis. Among these methods is infra-red spectroscopy, which is now, and is likely to remain, a routine tool of the chemist. The arrival of 'simplified' commercial instruments is making the infra-red spectrometer as commonplace in laboratories as the refractometer and is creating a class of user who has no interest in spectroscopy for its own sake and little in the principles of operation and design of instruments; infra-red spectroscopy is no longer the preserve of the physicist and physical chemist. Any book with the broad title *Infrared Methods—Principles and Applications* is thus likely to have drawn to it the attention of a very large number of students and research workers. It must be said, however, that many of these will find the title misleading, for the principles are those involved in generating, dispersing, and detecting infra-red radiation, the applications are in the calibration of detectors, the production of monochromatic radiation, in the design of instruments for industrial gas analysis and plant control, and in pyrometry. This book is written from the point of view of the experimental physicist, and when the authors suggest that it is an introduction to infra-red studies for "the research student and the student in allied fields" it should be understood that they refer to the research student of spectroscopy or allied fields of physics. The average worker in other fields who wants to understand how an infra-red spectrometer works and what its limitations are will find it far beyond his needs. Authors write as they view the subject, but it does seem remarkable to find a work such as this in a series of monographs on physical chemistry. There is, without doubt, a demand for an up-to-date authoritative account of practical methods in infra-red spectroscopy written with chemical applications strongly in mind. This monograph does not satisfy it.