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author bases his treatment on three postulates, which in essence assume that (1) even in irreversible processes, equilibrium persists locally, (2) the transport fluxes are linear homogeneous functions of all the forces associated with them, and (3) the Onsager reciprocal relations hold for the coefficients in these functions. These postulates permit the derivation of the transport equations with the help of the fundamental equations of hydrodynamics. The author then reviews in turn the transport of heat by conduction as well as diffusion, diffusion in isothermal systems, electrochemical systems, sedimentation, and centrifugation, together with a brief introduction to chemical reactions, which provide considerable difficulty, since for them the second postulate is not generally valid.

The treatment is highly analytical throughout, though the exposition is clear and the terminology reasonable. For the benefit of those students who have not studied tensor calculus, a special chapter on dyadics is provided in the appendix. With due consideration to its relative brevity, the book manages to cover a lot of ground of interest to the chemical physicist. Of course some topics get no consideration, e.g., the absorption and dispersion of sound in viscoelastic fluids. But one cannot have everything! The author is to be commended highly for his book, which will be of value to many physicists who ought to know more about what can be done with irreversible thermodynamics.

Superfluid Physics. By Cecil T. Lane. 226 pp. McGraw-Hill Book Co., Inc., New York, 1962. $9.50. *Reviewed by Eric Mendoza, University of Manchester.*

IN the first few decades of the rise of low-temperature physics as a separate subject of study, many investigations were aimed at extending conventional kinds of measurement to lower and lower temperatures. Textbooks tended to reflect these diverse activities and as a result they usually covered a wide range of topics which were more or less unconnected. Gradually, however, it became clear that superfluids, i.e., liquid helium and the superconductors, showed phenomena of quite a different kind from the others which had been loosely grouped together with them. At temperatures of the order of 1°K, thermal agitation had reached such a low level that energy gaps of a very special kind became evident. No longer were the effects of quantization restricted to small systems like atoms or molecules; they could now be made manifest on the macroscopic scale. *Superfluid Physics* is perhaps the first teaching text to restrict its scope to the new selection of topics.

After an introductory chapter dealing briefly with the general principles of producing low temperatures, the bulk of the book is devoted to the problems of liquid helium. Sections on the flow phenomena and thermal effects below the lambda point lead to those on the two-fluid model and second sound, then to long chapters on the Landau and Feynman theories, and quantized circulation in the rotating liquid. The subject is rounded

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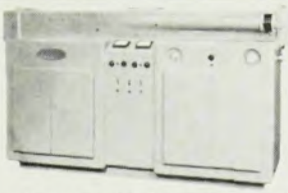

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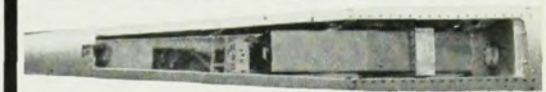

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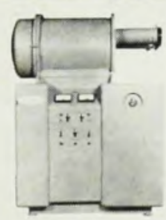

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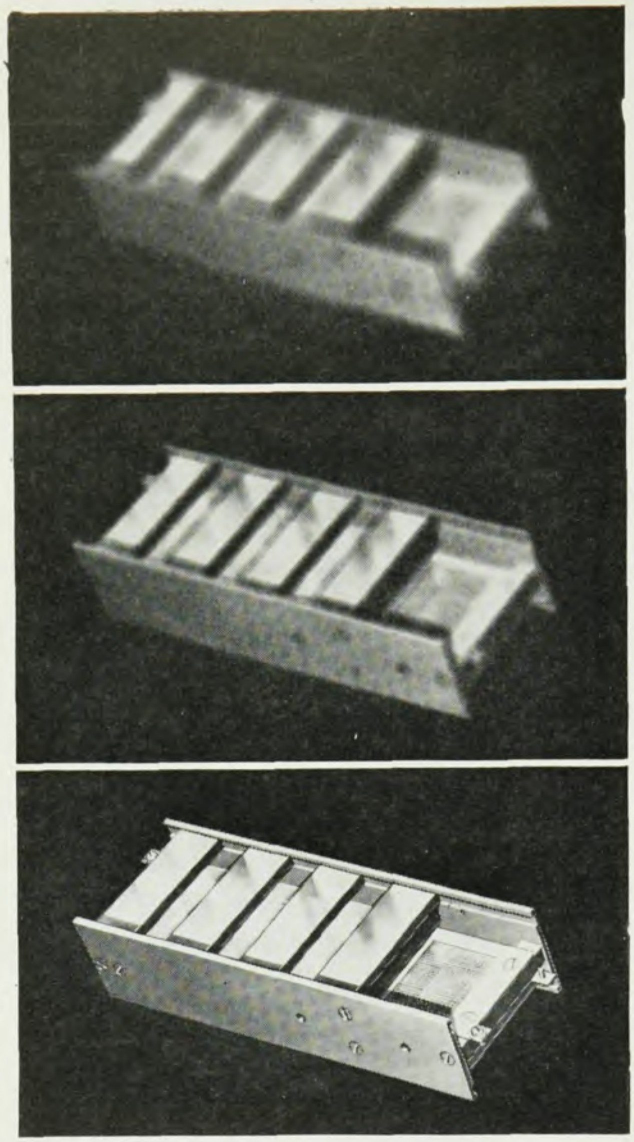

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off by a section on critical velocities. The other main topic, superconductivity, is covered in only about one third of the space devoted to liquid helium. Since this edition was written, several advances have been made which are very much in the spirit of this book: fluxoid quantization, the experiments to detect whether the unit carriers of the supercurrent are really pairs of electrons or higher multiples, and the work on high-field superconductors. It is very much to be hoped that a new edition will be brought out soon, incorporating this new material.

Superfluid Physics is intended as a text for first-year graduate students—primarily for those who do not intend to specialize in the subject but also as an introduction for those who do. It has therefore been written with the object of teaching students the physical principles behind every topic. Indeed as a teaching text it could hardly be bettered; it always leads gently from the relatively simple and familiar to the more abstruse. Above all, the writing is entertaining in a way that compels attention, and it manages to communicate some of the excitement of the gradual unfolding of the subject. It can be wholeheartedly recommended.

Ordinary Differential Equations. By L. S. Pontryagin. Transl. from Russian by Leonas Kacinskas and Walter B. Counts. 298 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1962. $7.50. *Reviewed by Dagmar Renate Henney, University of Maryland.*

IN many respects this is an excellent book. Being written by the world-renowned Russian topologist represents at the same time an advantage and also a disadvantage. The author is especially interested in problems which can be solved with the help of topological tools. The geometric treatment is given foremost consideration. Existence and stability of periodic solutions (the strength of the Russian school) are emphasized.

There is, in the opinion of this reviewer, not enough space devoted to the parts of differential equations which primarily concern the physicist. For example, bounded linear operators and problems dealing with the Sturm-Liouville theory have been treated only briefly.

Pontryagin's book compares favorably with the text on the same subject matter by S. Lefschetz. The Russian book is not as extensive, but somewhat easier to read.

The reviewer cannot go along with the publishers' claim that this text is designed for an introductory course. Without a thorough knowledge of advanced calculus, this book will be entirely incomprehensible (at least to the average American college student). The emphasis in the Pontryagin text is on applications of differential equations to the theory of oscillations and automatic control. It is not a "cook book", full of recipes on how to solve differential equations, but it is rather a modern, revolutionary book, designed to make the study of differential equations more interesting and attractive. The theory is developed for the most part in a remarkably beautiful way, which could only be ac-