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Book Reviews

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BOOK REVIEWS

P. Marage, G. Wallenborn (Eds.): THE SOLVAY COUNCILS AND THE BIRTH OF MODERN PHYSICS. Science Networks—Historical Studies, Vol. 22. Birkhäuser-Verlag, Basel, 1999. ISBN 3-7643-5705-3, xiii+224 pages, price EUR 83,46.

The book is a collection of papers mapping the rôle of the first seven Solvay conferences in shaping modern quantum theory in the first half of the twentieth century. Enabled by a generous funding by Ernest Solvay, a Belgian industrialist and amateur scientist, these conferences gathering together a small number of invited first-class physicists and devoted to carefully selected topics provided a useful forum for disseminating new ideas and for illuminating discussions, influencing in this way a further development in the field.

The book is divided into two parts. The first of them treats, say, the "institutional background": there are chapters devoted to E. Solvay, his opinions and foundations, to the relations of the Solvay Institutes to other important institutions (the Nobel foundation, the Cavendish laboratory), and to organisation of science in the 19th century in general. The authors of these contributions (B. Bensaude-Vincent, E. Crawford, D. Devriese, J. Hughes, P. Marage, G. Vanpaemel, G. Wallenborn) seem to aim at a sociological or even psychological analysis, the output being, in the reviewer's opinion, somewhat superficial. The other part of the book (written by the editors) focuses on the first (1911), second (1913), third (1921), fifth (1927) and seventh (1933) Solvay congresses that were devoted to quantum theory and provides—again in a rather cursory manner—an overview of then crucial problems of the theory as reflected in the debates at the Solvay conferences. The presentation is based mainly on already published (sometimes even notorious) material.

Jan Seidler

N. D. Kopachevsky, S. G. Krein: OPERATOR APPROACH TO LINEAR PROBLEMS OF HYDRODYNAMICS, VOL. 1: SELF-ADJOINT PROBLEMS FOR AN IDEAL FLUID. Birkhäuser-Verlag, Berlin-Heidelberg-New York, 2001. ISBN 3-7643-5406-2, 408 pages, price EUR 165,–.

This volume is dedicated to functional analytical analysis of several typical problems of continuum mechanics. Namely, the problems of the motion of solid bodies with cavities filled with fluids are addressed. These problems are especially important in aviation, tanker, and space engineering. The present book provides a detailed description of some results obtained by using several operator theory methods in the study of the dynamics of bodies with cavities filled with fluids.

There are three main streams in the book emphasized: methods for proving the existence of solutions to various initial boundary value problems; the investigation of the properties of normal oscillations and the structure of their frequency spectrum; and the derivation of asymptotic formulas.

The rather particular approach to concrete problems is compensated by a detailed list of references and additional bibliographical comments included in appendices. The book is introduced by a classical list of Hilbert space theory results in belief that it is convenient for the readership to which it is addressed, i.e., mostly mechanicians. An attentive reader will find in every section some theorems and lemmas, their proofs, and also physical interpretation of the main properties of the problems studied.

The book has two volumes and is divided into four parts. The first volume, split into two parts deals with the study of hydrodynamical systems containing an ideal fluid and includes basicly the description of self-adjoint problems. The "applied" part treats nonsmooth domains, such as containers with edges, cavities partially filled with fluid, etc. Therefore, in many problems the authors look for generalized solutions. Methods for the regularity arguments are not the subject of this book.

The second part of the book is devoted to the description of the motion of an ideal fluid in a stationary or moving container. Thus the problem of oscillation of a heavy ideal fluid in a container with an elastic bottom is treated.

The book will be important for applied mathematicians and engineers specializinf on fluid mechanical problems.

Ivan Straškraba

T. Roubíček: NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS WITH APPLICATIONS. Birkhäuser-Verlag (International series of numerical mathematics), Berlin-Heidelberg-New York, 2005. ISBN 3-7643-7293-1, xiv+405 pages, hardcover, price EUR 108,–.

The book focuses on the theory of distributed-parameter systems described by partial differential equations. The aim is to bring the general problems to a stage applicable to real-world tasks as fast as possible. The concrete equations and systems have applications in continuum (thermo)mechanics of solids and fluids, electrically (semi)conductive media, modelling of biological systems, or in mechanical engineering.

In Chapter I, auxiliary general material is presented without proofs. Then the book is divided into two parts, the first part deals with the boundary-value problems for semilinear or quasilinear elliptic equations in the divergence form and then, in Part II, the evolution variants of previously treated problems, completed by boundary conditions and initial or periodic conditions, are discussed.

The methods include construction of approximate problems, *a priori* estimates and limit passage, reformulation of the equation into a problem solvable directly by abstract theoretical results and iterational methods.

The monograph provides a self-contained presentation of the theory and offers insight into the subject in general context. It is addressed to researches and graduate students interested in the theory of partial differential equations, mathematical modelling and applied mathematics.

Hana Petzeltová