BOOKS

Process Level Instrumentation and Control by Nicholas P. Cheremisinoff, Marcel Dekker, Inc., 1981; 252 pages; $29.75.

This book is the second in a series devoted to engineering measurements and instrumentation. This particular volume covers the important subject of level measurement and control.

Level measurement is defined as the determination of the position of the interface between two phases when the phases are separated by gravity. Level measurement is classified into visual techniques, float-actuated devices, displacer devices, head devices, electrical methods, thermal methods, sonic methods, infrared devices, and nuclear devices. For each measurement method the basic principles, various embodiments, and commercial applications are covered. An extensive table of commercial applications of rotating paddles is included.

Level control is divided into two broad categories: (1) applications in which level is an important process variable and (2) applications in which flow stability from a vessel is the important variable. In the first category the control objective is to maintain near constant level in the presence of load changes. In the second category the exact level is unimportant except at the conditions where the vessel may run dry or overflow. Control terminology and the mathematical principles of control are briefly reviewed in Chapter 1. Types of control action and vessel dynamics are covered in Chapter 2. Specific control systems are covered with the various level measurement methods. Chapter 11 deals with valves and valve actuators as final control elements.

Safety considerations are addressed briefly in Chapter 2.

The book is an excellent and comprehensive treatment of level measurement and control. It is a valuable resource book for anyone with a need to detect and control levels and/or interfaces.

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Solar Energy Handbook, edited by Dr. Jan F. Kreider and Dr. Frank Kreith; McGraw-Hill Book Company; January 1981; 1,099 pages; $49.50.

The handbook represents the collected wisdom of at least forty-nine named engineers, scientists, economists and attorneys, for each of whom a short biography is appended. The majority have many years of practical solar energy related experience in the private sector. It emphasizes established applications and avoids areas less well documented. One could argue that lesser developed fields should receive some mention, if only to stimulate continuation and expansion of the solar technological momentum. However, the editors conservatively intended the book to be of archival nature, and this is the principal reason for exclusion of some of the newer, evolving developments. On the other hand, the neophyte to the area will find many new and interesting concepts introduced and explored in an informative, straight-forward fashion.

The material is divided into six categories:

(1) Perspective and Basic Principles (six chapters) in which are presented the history of solar energy uses and the scientific principles upon which the entire field rests. Solar irradiance, optical properties of materials, heat transfer, thermodynamics, and energy storage all receive concise but quite adequate coverage and referencing to the original literature.

(2) Solar-Thermal Collection and Conversion Methods (four chapters) considers nonconcentrating and concentrating collectors, as well as nonconvecting solar ponds. The latter represents a fascinating, if complex, system to retrieve solar radiation inexpensively on a large scale without elaborate fabricated collectors. The interactions which can occur between the heat and salinity transfers in such a collector provide a delightful study for all chemical engineers.

(3) Low-Temperature Solar Conversion Systems (nine chapters) details systems which maintain temperatures less than 100°C. These include solar water heating; air and liquid space-heating; space-cooling; performance, design and modeling methods; passive systems; ocean thermal energy conversion; agricultural drying; solar distillation and cooking systems.

(4) High Temperature and Process Heat Systems (three chapters) is devoted to solar-thermal electric power, process heating and solar-powered heat engines. These chapters provide excellent overviews of the technical, economic, societal, equipment and design considerations which shape the decisions being made respecting our energy future. Every engineer interested in the industrial applications of solar energy certainly should read carefully these chapters.

(5) Advanced and Indirect Solar Conversion Systems (three chapters) examines wind energy converters and systems, photovoltaic devices, and biomass energy conversions. Considerable recent effort has gone into these specialized areas of solar conversion. Technical understanding is improving, but the unfavorable economics continue to plague these areas as far as large scale, general use goes. The biomass area may well be a discipline to watch in the 1980's, especially as problems with oil, fossil fuels and nuclear energy continue to disrupt the smooth operation of the economy.

(6) Architecture, Economics, The Law, and Solar Energy (four chapters) considers the societal issues associated with implementation of solar systems. Legal problems, economic and architectural techniques and energy conservation principles are fully discussed.

Brief appendices of SI Units/Conversion Factor and Nomenclature are included. The handbook seems to be free of typographical mistakes, and the material is attractively presented. In summary, this is the only handbook devoted exclusively to the solar area. The objectives laid down by the editors have been successfully met, and the volume can be recommended for all who expect to deal in any way with this important discipline.

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