BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Textbook of Nuclear Medicine: Clinical Applications

Editors	Antonio Fernando Goncalves Rocha, M.D. and John Charles Harbert, M.D.
Publisher	Lea & Febiger, Philadelphia, Pennsylvania (1979)
Pages	495
Price	$32.50
Reviewer	D. A. Bromley

In all of medicine, the area of nuclear medicine is one of the most rapidly growing and has some of the most dramatic consequences. Application of the instrumentation, radioisotopes, concepts, and techniques of the nuclear scientist to medical problems, both diagnostic and clinical, is proceeding at a rate that makes almost any volume in the field obsolete before it appears. At the same time, because progress in nuclear medicine depends on the combined efforts of both physicians and nuclear scientists, it is essential for continuing progress that up-to-date review volumes be available, and, as nuclear medicine becomes more and more a recognized specialty within both medicine and nuclear science, it is of crucial importance that textbooks be available.

Rocha and Harbert, who are, respectively, director of the Center of Nuclear Medicine at Guanabara in Brazil and associate professor of medicine and radiology and director of the Division of Nuclear Medicine at the Georgetown University Hospital in Washington, D.C., have in this book made a major contribution to the available literature by coordinating detailed reports from 30 internationally selected experts in nuclear medicine.

The textbook contains 13 chapters on the thyroid, the central nervous system, the skeleton, the gastrointestinal system, the lung, the cardiovascular system, the kidney, adrenal scanning, the blood, tumors, pediatric considerations, water in electrolytes, and guidelines for evaluating new tests.

Obviously, with 30 different contributors, the level and quality of treatment vary throughout the text, but the editors have made an attempt to homogenize the material and minimize confusion on the part of students using the text. Illustrations have, on the whole, been well chosen and are used liberally.

As already noted, no textbook in this field can hope to be completely current and at the frontiers of so rapidly moving a field. This one is no exception. For any student of nuclear medicine, however, or for any nuclear scientist interested in nuclear medicine and what potential contributions he or she might make to it, this book can certainly be recommended. The practicing physician in nuclear medicine will find, however, that in his own area of specialization the book is already somewhat dated.

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Engineering Economy: Analysis of Capital Expenditures

Author	Gerald W. Smith
Publisher	Iowa State Press (1979)
Pages	579
Price	$22.95
Reviewer	Daniel F. Hang

Having taught from several engineering economy texts, I like much of Smith's approach, especially his treatment of income tax considerations. The book can provide the engineering student with an excellent foundation from which he can make an engineering economic analysis. Likewise, a practicing engineer can use the book to brush up on his engineering economic fundamentals, perhaps learn a few new ones, and find sufficient analysis technique to evaluate even the most complex project.

The nuclear engineer who needs to make an economic study for the most part will be dealing with a fission or fusion system. In either case, expenditures of investment capital and cost are spread over a wide period of time ranging from years before plant operation to years after shutdown. These expenditures may be made on the federal, industrial, and/or investor-owned regulated utility level where economic parameters that enter into the decision-making process are not at all alike. An engineer must

recognize and respect these differences in order to make a true comparison that will lead to a best decision between alternatives. Understanding the concepts and techniques presented in Smith's book provides the engineer with this insight.

The book has 22 chapters and an appendix with 10 sections. It is further arranged into seven parts. The first four parts plus some selected topics from the other three constitute a rather full three-credit-hour course. The rest of the topics and the abundant appendix make this book useful as a reference for the practicing engineer as well as a text. This being the third edition in 11 years indicates that Smith has kept up with changes in income tax laws and has incorporated them into his excellent presentation.

The first three parts of the book (eight chapters) appear much like other engineering economic texts in terms of subject material, except that the author links parts together much better. In Part I, "Enterprise Decision Making and Action in Management of Capital Equipment," the reader realizes the importance and place of engineering economy in the decision-making process. The relationship of economic studies to accounting is established. An excellent diagram of corporate flow of funds is illustrated early in the text. By use of this diagram, equations of equivalence can be written to feature the effect of income tax on studies. Similar diagrams appear in later chapters emphasizing the importance of cash flow in economic analysis. The author's presentation in the "Time and Money" section is complete when you include the more complex derivations that he included in the appendix. There are good example problems, cash flow diagrams, and homework problems to assist in learning the basic mathematics of finance. The author has used many abbreviations that are frequently repeated without redefining the terms. This may be disturbing to the reader until it is realized that Appendix A is devoted to "notations" where terms are defined by words or equation, as appropriate. There is further correlation of these abbreviations with suggested FORTRAN symbols in Appendix B. This is a real time saver for someone interested in establishing a corporate analysis model.

Smith combines his presentation of annual equivalent and present equivalent cost comparisons into one chapter, which eliminates a bias that often develops if they are presented separately. Many of his analysis diagrams are set up in a computer logic form allowing the user to clearly analyze the best approach to an economic analysis. The logic also suggests how computer codes can be developed to provide labor-saving solutions on repeat or similar projects.

"Income Tax Considerations," Part IV of this book, is treated in chapters on "Depreciation and Depletion," "Income Taxes," and "Analysis of Projects Financed by Public Funds." Smith has included the latest implications of fast depreciation methods in the tax laws in his presentations, tabulating the various options that are most beneficial. The chapter on income taxes is well presented and can be mastered by engineering students on their own. I've had several students that have combined employment hunting with their last semester with varying degrees of success. I usually present this chapter from notes taking a different approach that arrives at the same results. This allows them at least two methods to check their results. Those missing from class are forced to use the text's approach and they do just fine.

The cash flow analysis used by the author applies equally well for industry, investor-owned utilities, and for governmental agencies. Applied to each entity, the resulting conclusions are not the same because of varying degrees of income tax consideration (from full to none, respectively). Unfortunately, very few governmental agencies realize this and set down economic guidelines for economic studies that are void of income tax considerations. More often than not, erroneous conclusions result because of neglect or misuse of the income tax effect in the analysis. As pointed out by the author, most governmental agencies are guilty of promulgating poor engineering economic methods in their analyses.

If the author were to improve his income tax presentation, it would be by noting the economic effect of prepayment and post-payment costs on economic studies. Using the equations in the text, you arrive at the proper results in terms of revenue requirements. It is just the revenues obtained to match these revenue requirements that pose certain cash flow problems, especially to the regulated electric utility. The author does touch on some of this problem in his chapter on "Commitment and Investment Irreversibility," but does not speak to the subject directly. Today it is an important issue because of the long lead time for power plant construction and for funds apparently needed for radioactive waste disposal and plant decommissioning. On public-financed projects the author provides an adequate presentation to understand the good and bad aspects of the benefit/cost ratio concept to public financing.

The remaining parts of the book, "Multioutcome Considerations: Risks and Uncertainty," "Capital Budgeting Considerations," and the appendixes, add a great deal to the usefulness of the book. They provide the reader with an approach that more nearly represents real-world conditions. Up to this point, to get the basic concepts across, a rather idealistic approach on costs and timing had been assumed—items would last as long as assumed and few if any uncertainties existed. The author introduces risk and uncertainty of events and their probability of occurrence into the analysis. He introduces the nonuniform (dispersed) service life for equipment and the use of the Iowa Dispersion Curves and Tables for capital recovery factors. This provides the user with a better analysis approach to items that can be considered as group properties. Two sections of the appendix allude to inflation of money and the escalation of costs with time and how they may affect economic studies and decision making. When one includes all the above items into an economic analysis, decision making is then supported by computer analysis to determine the sensitivity of the more salient portions of the problem. The author at all times strives to make the concepts easily adaptable to computer computation. There is a quite complete set of interest tables and factors for use with the Iowa Curves in the back of the book. Before the days of pocket calculators, they used to be more useful. Now you can easily generate most of the nondispersion factors. Most of the text is written using discrete compounding; however, the author makes it very easy to convert to continuous compounding should that be your desire.

Smith's book has been a welcome addition to the group of texts on engineering economy.

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and economics. His research interests include the application of engineering economy to the nuclear fuel cycle, nuclear power generation, electric power generation, and environmental considerations in the electric power area. He is co-author of GEM (presently GEM Version 6), a nuclear fuel cycle cost code. He set up engineering economic courses for Commonwealth Edison Company, Illinois Bell Telephone, Illinois Power Company, and Argonne National Laboratory.

Plasma Transport, Heating and MHD Theory
(Proceedings from the Varenna International School of Plasma Physics Workshop, September 1977)

Editors	T. Stringer, R. Pozzoli, E. Sindoni, J. Carnihan, and G. Leotta
Publisher	Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, New York (1978)
Pages	440
Price	$48.40 paperbound
Reviewer	Chan K. Choi

This is one of three closely related proceedings from the 16-day meeting in September 1977, held at Varenna International School of Plasma Physics.[a] *Plasma Transport, Heating and MHD Theory* is, like the two other companion proceedings, a collection of review-type papers that were presented at the workshop. The entire 16-day meeting, which included ten half-days course and workshop and five full-days workshop, focused mainly on toroidal fusion systems, especially on tokamak systems, and virtually no attention was given to open-ended mirror systems. In this regard, the title of the current workshop proceedings could have been more properly called the "*Toroidal*" *Plasma Transport, Heating and MHD Theory*.[b]

The subject areas in this proceedings are divided into five subgroups: Modes and Instabilities; MHD Theory, Transport Phenomena and Codes; Heating; Blanket; and Experimental.

Modes and Instabilities covered mostly electron phenomena in tokamaks (such as trapped-electron modes discussing mode stabilization), runaway electron dynamics in the French tokamak Fontenay-aus-Roses (TFR) causing bump-in-tail instability, nonthermal radiation, etc. The stabilizing effect of magnetic shear is still controversial. The question is whether the shear will actually help the stabilization or remove it. Discussion of this subject is very penetrating and timely. [Additional information for readers on other modes and instabilities associated with ions (e.g., ion mixing mode) and drift-tearing instabilities in tokamaks, etc. can be found in the companion Proceedings I mentioned in footnote a. On the other hand, finite-beta equilibria, macroscopic stability, and collective modes such as high-beta tokamak instabilities, ballooning modes, etc. are discussed in Proceedings II, also referred to in footnote a.]

Mercier's MAKOKOT, a one-dimensional numerical simulation code, described in the plasma transport phenomena section, shows good agreement between the measured and computed profiles, while at the same time Stringer's "Anomalous Transport Theory," described via quasi-linear theory, also predicts an encouraging agreement between the anomalous energy loss observed in tokamaks and the calculations from the quasi-linear analysis. Though this analysis is not fully applicable to the real situation of a confined plasma (since the flux derived by this analysis is not a true diffusion), it provided a useful first approximation. It is desirable however that more appropriate theory be developed to describe the dispersion and transport; drift wave scalings of diffusion coefficient (D) are still uncertain as to temperature (T) dependence whether $D \approx T^{-1}$ or $T^{-1/2}$ (cf., Mercier) or $D \approx T$ (cf., Düchs).

Thorough discussions following these two lectures by Mercier and Stringer are the integral parts of the main lectures and they are so interestingly documented that reading text materials alone makes one feel like he is sitting in the middle of the conference room. Comments, questions and answers, and further discussions throughout the proceedings are of extreme pedagogical value for serious students in this field. One comment is that there is no description of the neoclassical transport phenomena, which is very important in understanding tokamak transport; however, Proceedings I deals, though in a simplified way, with this subject along with neutral atoms in transport, etc. Classical diffusion (with theory and simulation codes) and the transport phenomena for high-density tokamaks can also readily be found in Proceedings II.

Resistive magnetohydrodynamic (MHD) equations, MHD equilibrium (Grad-Shafranov equation), energy principle, circular cylindrical instability, toroidal instability, etc. are addressed in one way or another in the MHD Theory section. However, disruptive instability, which is of current interest among the INTOR tokamak community, was not addressed.

As for the heating mechanism, this volume mainly covered wave heatings (e.g., radiofrequency, electron, and ion cyclotron waves). Turbulent heating was addressed by Kock on p. 319; however, neutral beam injection, one of the leading technologies in plasma heating, was not mentioned here. [A simple theoretical description of neutral beam heating of toroidal plasma can be found on p. 323 of Proceedings I. For extensive coverage on the heating in toroidal plasmas, the two-volume *Proc. Heating in Toroidal Plasmas* from the 1978 Joint Varenna-Grenoble Int. Symp., T. CONSOLI, Ed., Pergamon Press, Inc., New York (1979) is available.]

Out of 440 pages in the current procedings, 126 pages were devoted to the "Blanket" and "Experimental" sections. Although they do not represent the main portion of

[a]The other two proceedings are *Proc. Course Theory of Magnetically Confined Plasmas*, EUR 5737e, B. COPPI et al., Eds., Pergamon Press (Apr. 1979) (called Proceedings I in this text) and *Proc. Finite Beta Theory Workshop*, Varenna, Italy, September 1977, CONF-7709167, B. COPPI and W. SADOWSKI, Eds., U.S. Department of Energy (Sep. 1978) (called Proceedings II). Other proceedings from the 1979 Varenna conference were scheduled to be available in the early part of 1981 through the U.S. Department of Energy.

[b]For mirror enthusiasts, there is the *Proc. Driven Magnetic Fusion Reactors*, Erice-Trapani, Italy, September 1978, BRUNO BRUNELLI, Ed., Pergamon Press, Inc., New York (1979), which includes subjects ranging from tandem mirror to mirror hybrid reactors.