physical theories. The thoroughgoing and, by the way, very authoritative treatment of this knotty subject matter does not make for light reading. Without thereby criticizing the author, the reader should be forewarned not to seek quick enlightenment in these pages.

In Chapters III, IV, and V the structure of physics is presented in the light of the theoretical concepts of logic and linguistics developed previously. It becomes evident that no part of physics is completely formalized in the sense that it satisfies all the requirements of logic, but the progress of science is disturbed but little by this shortcoming. Physical theories never start from *first principles*, we are reminded, and rarely find their way back to them. What is important is a clear understanding of the *language system* used and strict adherence to the *semantic rules* which form the framework of any theory.

The physical theories are grouped under the headings Classical Physics, Thermodynamics, and Quantum Physics. The sequence is not merely historical: thermodynamics, Hutten points out, is the "missing link" between classical and quantum physics.

The final chapter is entitled Scientific Method and Semantics. Hutten comes closest here to going out on a limb as indeed he must in discussing this subject. Traditional epistemology is attacked for "psychologizing" the analysis of the scientific method, i.e. asking questions like "how do we know" instead of attempting to reconstruct the logic of science. To "know" implies ontological assumptions about nature and a law-like operation of the universe. This, according to Hutten, is extraneous to the structure of science.

Physics of Reactor Design. Vol. 5 of Peaceful Uses of Atomic Energy; Proceedings of the Internat'l Conf. in Geneva, Aug. 1955. 545 pp. (UN) Columbia U. Press, New York, 1956. $9.00. *Reviewed by L. B. Borst, New York University.*

The present volume represents the first extensive discussion of the details of reactor physics on a truly international scale. As such it is particularly interesting to see that nothing seems to be held back by any party. The questions and discussions are entirely devoted to constrictive comparison of methods and results.

The subject matter covered includes the evaluation of the principal parameters for most reactor systems presently considered sound, and the methods used to convert these parameters to predictions for reactor systems. Data from exponential and critical assemblies are compared with the predictions and discrepancies are analysed.

The perturbations produced by high-level operation are discussed with greater completeness than previously. Generally speaking, no startling results were presented.

Perhaps the most unique and novel contributions were in the field of reactor kinetics. Time-dependent diffusion systems were described by representatives of the USSR and Sweden. The Russian experiments determined diffusion constants for a medium (H_2O, Be,

C) around a point source (14 Mev) which was pulsed (6 sec). The Swedish work demonstrated the feasibility of measuring the prompt kinetics of a subcritical reactor system.

Electromagnetic Waves. By G. Toraldo di Francia. (Translated by author, 1956.) 320 pp. Interscience Publishers, Inc., New York, 1953. $6.00. *Reviewed by Victor Twersky, Sylvania Electronic Defense Laboratory.*

This text (translated from the Italian "Onde Elettromagnetiche" by the author) is based on a series of lectures in the Physics Department of the University of Florence. It begins with a mathematical introduction dealing with vectors, tensors, Fourier series, and the method of stationary phase; it ends with a general treatment of resonant cavities. In between are chapters on units, potentials, fields in moving systems, circuits and transmission lines, propagation in homogeneous media, geometrical optics, diffraction, and wave guides. It includes a list of ten supplementary texts and historical sections on units, the electromagnetic field, special relativity, and wave theory.

The author's aim is "to give a clear and readily understandable introduction to those students who will later engage in theoretical research and also to those who will be concerned with the more and more brilliant applications of electromagnetic waves". However, although simply written and broad in scope, the treatment is often too casual. It has good general introductions to a large variety of topics, but contains practically no applications to specific problems. It includes no lists of problems, no references, and gives little indication of the present vitality of the subject.

For example, the sections on diffraction and geometrical optics are given a fairly firm basis for analytical work, but little is done with it. No mention is made of the rigorous work in diffraction theory initiated by Rayleigh's solution of the cylinder problem and Sommerfeld's solution of the half-plane, or of the new geometrical optics which arose from Luneberg's asymptotic representations of solutions of Maxwell's equations. The author's contention that particular problems are excluded because they "would in most cases amount to mere exercises on special functions" has, of course, some validity; however, it is the pedagogue's special function to choose illustrations that indicate the essentials and fruits of the methods rather than the tedium of their detailed application. Much better for the author to include "the customary little treatise on Bessel functions" in his mathematical introduction (not that such functions are necessary for many adequate illustrations) than leave the student with the impression that little has been accomplished since the time of Kirchhoff. (After all, an author that encourages his students to use tensors cannot keep them for long from other grim realities; better tell them about such things while their heads are still soft. Better still, make an ele-