

Book Reviews

Physics of Fast and Intermediate Reactors, Volume III: Proceedings of the Seminar on the Physics of Fast and Intermediate Reactors Sponsored by the International Atomic Energy Agency and Held in Vienna 3-11 August 1961. International Atomic Energy Agency, Vienna, 1962. 619 pp., \$12.00.

This volume, which is the third of three covering the Seminar on the Physics of Fast and Intermediate Reactors, contains the formal papers on reactor dynamics and the physics of specific reactors, as well as the informal Proceedings of the entire seminar. English is used for the Proceedings as well as for eleven of the eighteen formal papers; the remaining papers are in French and Russian.

The papers on physics of specific reactors cover the fast reactor at Dounreay, EBR-II, the Russian fast reactor BR-5, the French fast reactor RAPSODIE, a Russian pulsed fast reactor, and an epithermal thorium reactor. The physics of the Enrico Fermi reactor, although not the subject of a formal paper, is covered at some length in the Proceedings. These discussions perform the specific function of characterizing the neutron physics behavior of the specific reactors, and the more general one of indicating what neutron physics considerations play important parts in the reactor designs. Moreover, since the calculated physics characteristics are usually related to experimental work, either on critical experiments or on the reactor in question, they give a reasonably good picture of the status of neutron physics theory for the relatively small fast reactors which are currently under construction or in operation. The physics of the larger, more dilute reactors, which perhaps has the greater significance for the future, is covered mainly in other volumes of this series.

The section on reactor dynamics gives a more integrated picture of the dynamic theory of fast reactors, and of its implications for reactor safety and reactor design, than one might expect to find in a collection of individual papers. This coherence is facilitated by review papers on reactor safety, and by the inclusion of some work, notably some of the experimental work with the TREAT facility, which goes beyond the boundaries of neutron physics. Considerable attention is given to the problem of power-dependent structural distortions, and to methods of determining the reactivity feedback which may result. The importance of these considerations has been emphasized by the instabilities encountered, some years ago, in the second core of EBR-I; this particular manifestation of the problem is treated, and shown to be rational, in a paper which is apparently the final word on the subject. Other papers and discussions treat Doppler, temperature, and coolant-void coefficients of reactivity, neutron lifetime, methods of dynamic analysis, and dynamic analyses of specific reactors. It is evident that, in the past few years, significant advances have been made in the understanding of fast reactor dy-

namics and safety; the latter remains, however, one of the crucial areas in the development and design of practical fast breeder reactors.

Several speakers at the seminar were careful to point out that most of the safety problems of fast reactors are not inherent results of the fast neutron spectrum, but rather are characteristic of the specific embodiments of the fast reactor principle which are currently under development. However, until some alternate economically promising concept of the fast breeder is proposed, this distinction is a rather academic one: the fact remains that in the current concept the fast breeder requires, and is getting, more careful safety attention than most other reactor types.

The informal Proceedings, which occupy some 180 pages of the volume, are of particular interest. It is clear from the discussions of dynamics and safety that there are still differences of opinion as to the soundest design approach to fast reactor safety.

Although this volume will be of particular interest to the reactor physicist, the portion which covers dynamics and safety is sufficiently general to interest all who are concerned with reactor design and performance, and especially those who are engaged in the design of fast neutron reactors.

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(About the Reviewer: Joseph R. Dietrich was awarded the Ph.D. in 1939 at the University of Virginia. He has worked in the field of power reactors since 1946, first at ORNL and later at Argonne. At Argonne he was in charge of theoretical and experimental reactor physics on the Nautilus prototype reactor and on the BORAX reactors, and between 1954 and 1956 supervised the reactor physics work there on fast reactors and other reactors. He joined the General Nuclear Engineering Corporation upon its formation in 1956, and is Vice President and Director of the Physics Department. He is also Editor of the Technical Progress Review, Power Reactor Technology and is a Fellow of the American Nuclear Society.)

Fast Reactors. By R. G. PALMER AND A. PLATT. Temple Press, London, 93 pp, 1961, \$175.

Temple Press, in conjunction with the journal *Nuclear Engineering*, has prepared a large number of monographs on different subjects pertinent to the reactor field. In the publisher's note which prefaces "Fast Reactors," the scope of the monographs is said to be "...intended for university and technical college students, research assistants and qualified technicians...." "Fast Reactors" reaches this audience adequately and, in fact, can be a useful introduction for anyone in the reactor field who has had no previous