tion of thermal fluxes and of resonance escape probabilities. Since these are the problems with which they and their associates have been most closely concerned, this course allows authoritative statement at the expense of completeness. There is, however, a subtle secondary effect. In general, the statistical problems in the field they cover are less severe than they are, for example, in shielding calculations. Thus, some of their observations, valid within their field, are not safely applicable to more general situations. We have in mind, in particular, their emphasis on the importance of normality of sampling distributions, an emphasis that would be distinctly out of place in deep penetration problems.

There are some striking omissions in addition to those planned and noted above. Neither time dependence nor the management of complex geometries is mentioned or discussed. Also, and, especially in the field of problems discussed in depth, one would like some guidance in the choice between the Monte Carlo method and more conventional methods for specific problems or classes of problems; none is forthcoming.

One of the chief attractions of the Monte Carlo method is its capacity to handle transport problems without extensive approximations. Here, however, we are led to believe that the multigroup approximation, for example, is the only method for handling energy dependence. The use of Monte Carlo as a design tool might not be practical without this and the authors' further approximations, but the reader is entitled to know that he can do better if he is willing to pay the price.

We come now to a tender subject: the quite startling frequency of error, by no means all typographical, in the book. The following list is, in all probability, far from exhaustive.

Page xiii, first paragraph. One can, by the use, for example, of a next flight estimator in an analog process, estimate the flux at a single point (see pp. 110-111, text).

Page 4. The equation displayed in point (5), middle of page, is meaningless; Δ, on the right, should be replaced with Δ^{-1} on the left (Δ is bound, by $\lim\limits_{\Delta \to o}$, to the left side).

Page 21, last paragraph. In addition to the evident flaw in the discussion, there is a further technical flaw, which leads to a possibly interesting problem. The condition (1.5.4) does not say, as the authors probably intended, that *each* subcube of the unit n cube carries the proper mass; this is only asserted, by (1.5.4), for those subcubes whose main diagonal lies on the main diagonal of the unit n cube. This does not imply the desired stronger result.

Page 28 (middle). As it stands, the discussion is wrong; one must take into account in the test the maximum of $h(x)$.

Page 34. The footnote here is, with any reasonable interpretation, at least very misleading, and should be deleted or ignored.

Page 37. The reviewer finds no reason for viewing the multiplicative congruential method as a variant of the mid-square method. Also (bottom of page), the mixed congruential method increases the period of the least significant digits only by a small factor; at most, 4. This is true also of the period of the generator as a whole, if the multiplicative generator is properly selected.

Page 44. The footnote here is quite optimistic.

Page 56. The basic equations (2.4.1) and (2.4.3) and the discussion of (2.4.5) are all completely wrong; these quantities are not probabilities. For example, $p(x)$ is not the probability of extinction at x (which is, presumably, zero for each x); instead, $p(x)\, dx$ is the probability of extinction somewhere in a small volume dx near x. Probabilities are functions of sets, not of points!

Page 69. The use of pseudocollisions, for an entirely different purpose, was introduced independently and at the same time by the British designers of the GEM code. They noticed that one can greatly simplify neutron tracking by making total cross sections equal from region to region with the help of pseudocollisions. See *Proc. Conf. Application of Computing Machines to Reactor Problems, May 17-19, 1965*, ANL-7050, Argonne National Laboratory.

Page 88. The definition of subcriticality given here is not quite equivalent to the second definition given on page 94. If there is no particle multiplication, they are equivalent. But a system allowing particle multiplication which is just balanced by absorption and leakage, and hence just critical by the later definition, is subcritical by this one. For, in such a system, each particle, and indeed each family of particles, is still obliterated with probability 1. However, the expected number of collisions appearing in such a family history is infinite, while this expectation is finite in cases which are really subcritical. Thus, each statement later made about subcriticality should be checked for validity. If a definition of this type is needed, we might define a subcritical system as one in which each random variable with bounded, collision-dependent contributions has finite expectation (maybe).

Page 155, Table 4.1. The entries for $e = 1.4$ and 3.8 are clearly erroneous; only a little less clear is the error for $e = 2.4$.

It is indeed unfortunate that the many flaws in this book have left no room for adequate discussion of its many merits.

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About the Reviewer: Bob Coveyou has been at the Oak Ridge National Laboratory since 1943 where his interests have been primarily in the physics of nuclear reactors and in the development and application of Monte Carlo calculations in that field. Mr. Coveyou received his academic training at the Universities of Chicago and Tennessee. He recently completed a two-year assignment to the International Atomic Energy Agency in Vienna.

Nuclear Theory, Volume 1: Nuclear Models. By Judah M. Eisenberg and Walter Greiner. North-Holland Publishing Company, New York (1970). 476 pp. $23.00.

The present volume, number 1 in a three-volume series, concentrates on the theory of the phenomenological models for the collective degrees-of-freedom of the nucleus. One of its distinctive features lies in its unified treatment of the collective motion associated with the deformation variables of the nucleus (vibrations and rotations) on the one hand and the neutron-proton density fluctuations (giant resonances) on the other. Research workers in the field will find much of interest in this volume, although its main aim is to serve as a text for an intermediate graduate level course in nuclear theory. In building a careful foundation and filling in most of the details of the formalism, the authors have been admirably successful in creating an excellent text which can serve not only as a basis for a lecture course but could be picked up by the beginner in the field and read from cover to cover as a thorough introduction to the subject matter. In their preface the authors "anticipate that many nuclear experimentalists will feel more at home with a book which puts in the intermediate steps; . . . when the details are left out ostensibly to simplify the account, this omission usually only succeeds in mystifying." With this philosophy, for example, the transformation of the quadrupole collective Hamiltonian to intrinsic coordinates (the Euler angles and shape defining parameters) is carried through in much more detail than can be found in the original literature. The peculiarities of the transformation from the laboratory to the intrinsic system associated with the lack of 1:1 correspondence between the intrinsic coordinates and the variables in the laboratory system is treated with much care. The resultant symmetry properties of the wave function have undoubtedly been one of the "mystifying" points to which the authors refer. These symmetries are carefully established and discussed in detail, first for the vibration-rotation wave functions, and in later chapters for the cases where the vibrating-rotating nucleus is strongly coupled to the independent particle motion and the various giant multipole modes.

After an introductory chapter on the varieties of collective motion, the collective variables for the nuclear shape deformations and the local density fluctuations of protons vs neutrons (giant resonance motions) of definite multipolarity are established in completely parallel fashion in Chap. 2. The next two chapters give a detailed account of the theory of quadrupole vibrational spectra including the effects of large anharmonicities on the collective potential energy surfaces. Chapter 5 on the quantum mechanics of the rotator is distinguished by the care with which it compares and contrasts the operator calculus for the angular momentum components with respect to laboratory and intrinsic body-fixed systems. It gives a working introduction to the rotation matrices, the D functions. (In some of the earliest sections of this volume a familiarity with the transformation properties of spherical tensor operators, angular momentum calculus, nine-j transformations, etc., seems to be implied; all these topics, however, could perhaps be mastered by the beginner with appropriate sections of this work itself, including, besides this chapter, an appendix on angular momentum calculus in Vol. 2 of the series.) In Chap. 6, the Rotation-Vibration Model, the approximate separation of the Hamiltonian into vibrational and rotational parts and the perturbation expansion of the vibration-rotation interaction term together with its solution is treated in considerable detail, with an account of some of the successes of the model. After a brief account of the asymmetric rotator model in Chap. 7, the text turns to the single particle models. The scope of Chap. 8 on the spherical shell model is that of the monograph by Mayer and Jensen, though in abbreviated form. (This is not a textbook in the techniques of shell model calculations. The only shell model "calculation" performed is that for the quadrupole moment of a system of identical nucleons, j^n, in the low seniority model.) Chapter 9, the Deformed Shell Model—Unified Model, gives a discussion of the Nilsson model and its generalizations as well as a treatment of the coupling of the independent particle motion to the vibrating-rotating system. Compared with some other sections, this latter topic is discussed in relatively less detail (although the basic phenomena, for example first-order Coriolis decoupling and band mixing, are discussed). The remaining third of the text deals mainly with giant resonance phenomena. Chapter 10, Nuclear Hydrodynamics, first gives an elegant treatment of the classical theory of the neutron-proton fluid model and the associated classical electromagnetic absorption cross section. The subsequent quantization of giant resonance modes of definite multipolarity builds beautifully on the earlier treatment of the surface degrees-of-freedom. In Chap. 11, the Dynamic Collective Model, the authors give a very detailed account of the coupling of the giant resonance and surface quadrupole modes. In this chapter, in particular, the authors take the opportunity to present and summarize many of their own original contributions to the field. (A microscopic description of the giant resonances in terms of particle-hole excitations and subsequent thermalization via more complicated nuclear excitations is not to be found in this volume but is promised for Vol. 3 of the series: Microscopic Theory of the Nucleus.) A final chapter, the Application of Nuclear Models to Heavy Ion Scattering, takes up two topics. The first, the classical mechanics of two ions in collision, under Coulomb repulsion with internal degrees-of-freedom consisting of quadrupole plus octupole surface and giant dipole resonance modes is very much within the scope of this volume. The physical insight brought to the discussion of this problem is characteristic of much of this text. The second topic, quasi-molecular states, perhaps hangs somewhat by itself.

A long list of references to the literature is given. These include the historically important ones and many other detailed ones as they are needed to reinforce specific points in the text. This particular reader has found among the many references to the German literature, including theses, some which have previously escaped his notice. Nuclear model theorists who look to Copenhagen as their Mecca will undoubtedly be missing some favorite references. However, this should not detract from the enjoyment of an excellent book which can be recommended to both student and lecturer in the field.

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Radiation Heat Transfer. (Rev. ed.) By **E. M. Sparrow** and **R. D. Cess.** Brooks/Cole Publishing Company, Belmont, California (1970). 340 pp.

The revised edition of this popular text, first published in 1966, differs from the earlier edition only in two aspects: the elimination of misprints and the addition of Appendix C, which lists 10 to 20 problems for each chapter. A solution manual is also available for the instructor's use. Since the basic technical content remains unchanged, my review of the earlier edition (*Nucl. Sci.*