nuclear energy have outrun the realities associated with the use of this necessary energy source. The lack of a true energy policy in the United States is noted as in the fact that energy technologies to solve the "energy problem" must be thought of as complementary rather than as competitive. Specific issues addressed include energy and society, nuclear power economics, the fuel cycle, nuclear weapons proliferation, safety, and risks. The authors include in their presentations discussion of some of the past and present myths associated with the nuclear industry. The authors feel they lack the necessary expertise in the political, sociological, and psychological areas; therefore these areas are not addressed in detail. However, the importance of these factors is clearly noted.

Review of this text shows that the nuclear industry is learning the techniques employed by the "anti-nuke" movement to include methods of media and political structure manipulation. Delays of government action related to some attitudes of "let the next administration solve it" and the impact of these delays on nuclear power programs are detailed. Examples of the current energy situation are discussed with the purpose of illustrating the failure to distinguish symptoms from substance and to emphasize the need for a good energy employment strategy.

This book should be considered essential reading for those concerned with America's energy future. While pronuclear in theme, there is not an attempt to convert the dedicated antinuclear individual. All energy sources are analyzed with respect to general properties, inherent risks, and capability for meeting the energy demands of industrial societies.

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Introductory Nuclear Reactor Dynamics

Authors	K. O. Ott and R. J. Neuhold
Publisher	American Nuclear Society (1985)
Pages	362
Price	$43.00
Reviewer	David L. Hetrick

Among the books on nuclear reactor dynamics published since 1970 are those by Akcasu et al.,[1] Hetrick,[2] Lewins,[3] and Ash.[4] The new book by Ott and Neuhold is a welcome addition to this list.

The five books are very different in scope and depth. Ott and Neuhold have restricted the scope of their book by not including reactor stability, control systems, or noise analysis. They have included derivations and solutions of reactor dynamics equations in many approximations. There is a good selection of practical applications and academic illustrations.

I was pleased that the title of the book contains the word "dynamics" rather than "kinetics." But on p. 3 we read that dynamics is to be divided into two subtopics: (a) kinetics (dynamics without feedback) and (b) dynamics (dynamics with feedback). This definition explains the title of Sec. 11-4C: "Comparison of Kinetics and Dynamics Results." There is a tradition in engineering mechanics (not honored by all textbooks in that field) that mechanics is divided into statics and dynamics, and that dynamics is divided into kinematics and kinetics. The late Jack Chernick said 20 years ago: "Who cares? Kinetics, dynamics; if there's a difference, then I do reactor kinematics." Indeed, let us stamp out the difference.

I have a personal bias against the symbol "Λ" for the neutron generation time. I had hoped that this usage was dying out. It must be tiresome to stand in the classroom, chalk in hand, speaking of "big lambda" and "little lambda" in the same equation.

The concept of "reduced precursors" is useful, particularly in providing better scaling in numerical computations. It can, however, be misleading. One can lose sight of the physical sources $\lambda_k C_k$ and claim that "the stationary solution is independent of the generation time" (p. 84); this is proper only for some nonphysical reduced variables. Nor is it especially helpful to claim that the zero-generation-time (prompt-jump) approximation is any more elegant in terms of reduced variables (pp. 35 and 162); it is no chore to remember that $p(t)$ and ΛC_k are of the same order in slow transients. Of course, this becomes moot if one uses state variables normalized to their stationary values, as suggested by good computer programming practice.

I find it awkward to think in terms of several different point reactor models (intuitive, plain, exact, etc.). In particular, one need not have a time-independent shape function to derive the point reactor model (p. 76). Indeed, it seems preferable, from both physical and mathematical viewpoints, to identify one basic point reactor model that has a multitude of derivations and a corresponding multitude of parameter definitions. Surely this is better than having a different dynamic model with its own special name for each set of definitions of parameters.

Chapters 6 and 8 are particulary well done, except that the so-called precursor accumulation approximation (p. 88) seems like excess baggage. It is equivalent to a second-order system that is mathematically no simpler than the ordinary one-group point reactor model, but one of its eigenvalues is always positive (even for negative reactivity). Its validity is restricted to reactivities near prompt critical and beyond (the same range as the ordinary one-group model using a weighted average λ). It is also physically inconsistent; the quantities $\lambda_k C_k$ are treated as constants in the precursor equations and variables in the power equation.

Chapter 7 ("Microkinetics") is a pseudostatistical treatment of neutron flux as a superposition of "average fission chains," each of which is described by ordinary continuous reactor dynamics. I found it philosophically unsatisfying and of limited usefulness. I would have preferred some probabilistic neutronics such as Rossi-α or an introduction to reactor noise analysis.

The distinction between "static" and "dynamic" reactivities (p. 186) seems artificial. Whatever definition of reactivity is applied, static reactivity ought to be a special case of dynamic reactivity (for example, the initial and asymptotic states for some transient). If material properties are changing with time, then the reactivity is dynamic whether the shape function in the definition is time dependent or not.

The reactivity ramp example in Fig. 10-8 is used to suggest that a fast ramp "can only push a fast reactor beyond prompt critical by a small fraction of a dollar" (p. 269). In the example (50 dollar/s) the peak power is only 2.4 times the average power and the maximum reactivity is 9.5 cents above prompt critical. This transient is comparatively mild because the minimum power is relatively large. The same analysis with a very small initial power (as in a startup accident) would predict a more severe excursion.

Some minor points are: On p. 177 the time scale in Fig. 8-7 should be 2, 4, 6 ms, etc. Some nonstandard units appear on p. 232, for example, density in grams per cubic millimetre (Système International?). The energies on p. 263 add up to 90% (neutrinos, maybe). The bottom row of Table 11-II on p. 311 is for a fast core. The footnote on p. 320 should refer to Eq. (11.35).

It is unfortunate that the title of Bob Keepin's book[5] is misquoted in the references. This reminds me that I wanted to include another shot in my campaign for bibliographical responsibility: A single alphabetical bibliography would be superior to references arranged numerically after each chapter, especially when there is no author index.

My disagreements with this book are largely matters of definition and style. I learned much from reading the book, and it would be good for a one-semester course that does not include stability theory, reactor controls, or noise analysis.

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