to acquire a flavour of current developments in an important area of application, provided that the reader is familiar with the general background of the problems discussed. It would be pleasant to suggest that the volume might also be read by those involved in determining energy policy, but the mathematical content and academic nature of many of the contributions make this unlikely.

As with all the volumes in this series the price, by paperback standards, is rather too high to make the purchase of what is essentially a "state-of-the-art" issue attractive to the individual reader. It would however make a useful library acquisition.

JIM BRYANT

**Reliability Modeling in Electric Power Systems**

J. ENDRENYI

*John Wiley, New York*, 1978. 338 *pp.* £17.00

The present status of this, still developing, subject owes much to the numerous published works, over some three decades, of utility engineers, academics, consultants, researchers and manufacturers' staffs working in Canada and U.S.A. Dr Endrenyi, a utility engineer, has condensed into a single volume text, a well-chosen subset of the available material on power system reliability evaluation together with a succinct lead-in to general systems reliability theory, the content having evolved from a graduate course of lectures.

The first five chapters (over one-hundred pages) plus two highly condensed appendices (almost sixty pages) summarising some essential mathematics on probability theory and stochastic processes, provide a concise introduction to the reliability evaluation of repairable and non-repairable systems and could usefully be perused by those seeking a quick and compact introduction to system reliability, regardless of their particular specialisation. After briefly introducing the reliability concept and various aspects of component reliability, individual chapters are devoted to network methods, state-space methods and "other" methods which may assist where the first two fail, including fault tree analysis and Monte Carlo simulation. Under network methods, ideally suited to non-repairable systems composed of two-state independent components, the reliability evaluation of series-parallel systems and systems reducible thereto (using, for instance, minimal-ties or -cuts or a decomposition approach) is described. The state-space method is shown to be ideally suited to the reliability evaluation (including frequency and duration indices) of repairable systems of limited size having exponentially distributed up- and down-times, leading to the solution of Markov models; the book describes how, with some added complexity, the (more realistic) assumption of non-exponential repair times can be accommodated.

Power system applications covered in the remaining half of the book are the major ones of generation margins and risks (for both static and operating reserves), the reliability of interconnected systems, bulk supply systems, area supply systems and distribution systems. A generous sprinkling of examples illustrating application of the theory, make the book suitable for both power engineers and advanced students embarking upon an initial study of the subject.

Direct comparison with the trilogy[1–3] authored or co-authored by Professor Billinton is not entirely appropriate, the present text including some material occurring in each. The first introduces the subject at a more leisurely pace to a lesser horizon, the second is closest where common power system topics occur, while the third presents a far more exhaustive treatment of general systems reliability modelling.

The book appears remarkably free of errors and is highly recommended.

ROY JENSEN

REFERENCES

[1] R. BILLINTON (1970) *Power System Reliability Evaluation.* Gordon & Breach, New York.
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[3] C. SINGH and R. BILLINTON (1977) *System Reliability Modelling and Evaluation.* Hutchinson.