

BOOK REVIEWS

Operational calculus. By B. van der Pol and H. Bremmer. Cambridge University Press, 1950. 14+415 pp. \$10.00.

Any new book on the Heaviside calculus or on the Laplace transformation must prove its worth in competition with a large and established literature containing such favorites as Titchmarsh, Doetsch, and Widder for the mathematician, or McLachlan and Churchill for the engineer and scientist. Even in this heavy competition the book under review is likely to succeed, for it offers some points of novelty of considerable interest, its choice of material and style of exposition is "best possible" for a certain class of readers, and it is very well written.

Some novel features of the book will be noted later, but it must be mentioned already here that the style of the exposition is likely to become the greatest asset of this book, and that it is somewhat of a novelty—at any rate as far as literature in English is concerned. Every mathematical book written primarily for engineers encounters this peculiar difficulty that a purely formal presentation is admittedly inadequate even from the engineer's point of view, and yet a mathematically sound and rigorous presentation under sufficiently general conditions is far beyond the scope of such a book; and insofar as a "sound" presentation remains unintelligible to many of its readers, it defeats its purpose. The reaction of the best authors to this situation varies. Some (for instance McLachlan in his last book on operational calculus) develop the mathematical matter that is necessary for the understanding of the finer points of the exposition. Others assume a certain standard of mathematical education, and give a sound presentation under suitably simplified conditions. For instance Churchill, in his *Modern operational mathematics in engineering*, develops the theory of the Laplace transforms of sectionally continuous functions, although he points out that more general types, for instance functions with infinite discontinuities, appear in very many applications. Van der Pol and Bremmer adopt a different attitude. They make a point of stating the results in a form sufficiently general for all applications which they envisage. Instead of sectionally continuous functions, they talk of functions of bounded variation, admit integrable infinite discontinuities, mention Stieltjes integrals, and in the inversion formula consider Cauchy principal values and integrals which are Cesàro summable rather than convergent. Of course they cannot prove their results in this general form. Instead of attempting