Mathematics in Physics and Engineering, by J. Irving and N. Mullineux, Academic Press, New York and London, 1959. xvii + 883 pages.

This large compendium contains little that would be of great interest to practicing mathematicians. It is aimed rather at physicists and engineers who may wish to acquire an ability to read mathematically flavoured papers in their own field. A wide, if somewhat manual-like, listing of standard mathematical procedures is given and emphasis is placed upon applications rather than upon any deep analysis of the theory. Examples have been drawn from many physical fields to illustrate the scope of the various processes. In order to save space, the authors have avoided detailed discussion of the physical origins of the problems cited. For similar reasons, physical interpretation of solutions has been curtailed. This book, then, will genuinely serve the learner of mathematical routines and will furnish him with a knowledge of their fields of application at the level of specific calculations. It is questionable whether it, alone, will provide such a person with sufficient mathematical or physical insight to apply these techniques to fresh unsolved problems.

The book reads easily and contains a wealth of material in its twelve chapters and mathematical appendix. At the end of each chapter and of the appendix there is a list of twenty problems for which answers are provided. The chapter headings are: 1. Introduction to partial differential equations. 2. Ordinary differential equations: Frobenius' and other methods of solution. 3. Bessel and Legendre functions. 4. The Laplace and other transforms. 5. Matrices. 6. Analytical methods in classical and wave mechanics. 7. Calculus of variations. 8. Complex variable theory and conformal transformation. 9. The calculus of residues. 10. Transform theory. 11. Numerical methods. 12. Integral equations. Appendix (84 pages).

The selection of topics is, on the whole, good and the book is stocked with formulae and properties of special functions, though the elliptic functions are meagrely treated. Riemann's method for linear hyperbolic equations in two dimensions is given, though the use of Green's functions with elliptic partial differential equations is avoided. More use could have been made of expansions in complete sets of orthonormal functions. Chapters 8 and 9 provide a simple account of the many uses of complex variable theory, whilst Chapter 10 gives quite complicated calculations involving multiple transform theory.

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