Book Review

Field Computations in Engineering and Physics

A. S. Thom and C. J. Apelt

(Van Nostrand, 1961, 168 pp., 30s.)

The author’s object in this book is to describe, by means of theory and example, the method of “squares” for the solution of boundary-value problems in two-dimensional partial differential equations. This method has been developed and applied by Professor Thom and his colleagues (including, more recently, Dr. Apelt) during the last thirty years. For example, we are indebted to Professor Thom’s valuable work for much of our knowledge of steady viscous flow past bluff bodies in the range of Reynolds number below that at which a periodic wake develops.

The method of squares differs from the “relaxation” method in that the former is a straightforward iterative method, whereas in relaxation the individual worker uses his experience and skill to determine the precise step to take at a given stage of computation. For this reason the authors emphasize that the method of squares is far more suitable than the relaxation method for use with a digital computer. This is certainly an important factor in a comparison of the two methods, but it should be borne in mind that much of the work described in the book was done with a desk machine.

After two useful chapters on finite differences, several chapters of the book are devoted to the solution of Laplace’s equation for various boundary conditions. Following are chapters on the solution of Poisson’s equation, fourth-order linear equations, the Navier-Stokes equations of viscous flow, and the equations of compressible fluid flow. The book is liberally illustrated and has many examples, mostly taken from the fields of fluid motion and elasticity theory. It is recommended to those interested in the numerical solution of partial differential equations.

J. T. Stuart.