

INTRODUCTION TO BESSEL FUNCTIONS

FRANK BOWMAN

Physicists, mathematics students, designers of vibrating systems, mechanical, electrical and civil engineers, aero- and hydrodynamicists, and teachers of mathematics, physics and engineering will find this book a clear, full introduction to the properties and applications of Bessel functions. Practically all of the advanced mathematics needed is developed in the text. Students who have had some calculus and the elements of differential equations should find this work completely self-contained and suitable for self-study, class use or as a supplement to more general texts.

In the first two chapters the properties of $J_0(x)$ are considered with respect to the Fourier-Bessel expansion and illustrated by applications to the vibrating circular membrane and hanging chain. The third chapter is concerned with the modified Bessel function of zero order and its application to the flow of alternating current. Chapter 4 covers definite integrals such as the Lipschitz integral and the gamma function and such applications as the analysis of the electrostatic potential of a charged disc. The three final chapters discuss asymptotic expansions of the functions of zero order, the properties of $J_n(x)$ and applications to Kepler's problem, critical length of a vertical rod and normal modes of vibration. 226 problems throughout the book enable the student to test and extend his understanding of the theory and applications of Bessel functions.

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