Contents

List of Symbols	IX
Introduction	1
Chapter I. Some Information from the Theory of Cylindrical Functions	Ę
1. The Differential Equation and Recursion Relationships for Cylindrical Functions	Ę
2. Generalized System of Functional Equations for Cylindrical Functions and the Inhomogenious Bessel Differential Equation	8
3. Integral Repesentations of Cylindrical Functions in the Poisson Form 4. Integral Representations of Cylindrical Functions of the Bessel-Schlaefli and Sonine Form	11
	1.
Chapter II. General Theory of Incomplete Cylindrical Functions Expressed in Poisson Form	21
	22
· · · · · · · · · · · · · · · · · · ·	27
	32
4. Differential Equations for Incomplete Cylindrical Functions	35
5. Incomplete Lipschitz-Hankel Integrals6. The Relation between the Incomplete Lipschitz-Hankel Integrals and	41
_	48
7. Series Representations for Incomplete Cylindrical Functions8. Incomplete Beta and Gamma Functions and their Relation to Hyper-	52
·	57
9. Asymptotic Series and Methods for their Construction	61
	66
Chapter III. Incomplete Cylindrical Functions of Bessel Form	76
1. Definitions of Incomplete Cylindrical Functions of Bessel Form	76
2. Recursion Relations and Differential Equations for the Function $\varepsilon_{\nu}(w,z)$	79
3. Connection between Incomplete Cylindrical Functions of the Poisson	
and Bessel Forms	82
Indices	85
5. A Generating Function, Addition Formula, and Series for the Function	89

Contents VII

6. Asymptotic Expansions for Incomplete Cylindrical Functions of the Bessel Form	95
 Asymptotic Expansions for Incomplete Cylindrical Functions; the General Case Incomplete Airy Integrals and their Generalizations Asymptotic Expansions of Incomplete Cylindrical Functions of the 	103 108
Bessel Form for Large Indices	112
Chapter IV. Incomplete Cylindrical Functions of Sonine-Schlaefli Form and the Incomplete Weber Integrals	116
 The Concept of Incomplete Cylindrical Functions of Whittaker Form Incomplete Cylindrical Functions of Sonine-Schlaefli Form and their 	116
Basic Properties	117 121
 Incomplete Weber Integrals	
5. The Connection between Incomplete Integrals of Weber, Lipschitz- Hankel and Incomplete Cylindrical Functions of Poisson Form	
6. The Connection between Incomplete Weber Integrals and Lommel Functions of Two Variables	138
Chapter V. Incomplete Cylindrical Functions of Real Arguments and their Relation to Certain Discontinuous Integrals	141
 Incomplete Cylindrical Functions of Real Arguments Unit Functions and their Basic Characteristics 	
3. New Integral Representations for Incomplete Cylindrical Functions of Real Arguments	146
4. Relation between Weber Integrals of Bessel Functions and Incomplete Cylindrical Functions	152
5. Discontinuous Integrals of Gallop and their Relation to Incomplete Cylindrical Functions	
6. Sonine's Discontinuous Integral and its Connection with Incomplete Bessel Functions	
Chapter VI. Integrals Involving Incomplete Cylindrical Functions	166
1. Improper Integral of Lipschitz-Hankel	
 Integrals of Weber Type Involving Incomplete Cylindrical Functions Improper Integrals of Certain Incomplete Cylindrical Functions with 	
Respect to Index	
Incomplete Cylindrical Functions	
Functions	
Chapter VII. Application of Incomplete Cylindrical Functions to Problems of Wave Propagation and Diffraction	190
1. Connections between Incomplete Cylindrical Functions and some	
Tabulated Special Integrals	197

VIII Contents

 The Problem of Diffraction by a Wedge	205 213 219
Chapter VIII. Application of Incomplete Cylindrical Functions to some Problems of Solid State Theory and the Motion of Charged Particles in Electromagnetic Fields	228
 Computation of Radiation and Absorption Fields in the Theory of Multiphonon Processes	228 232 237
Magnetic Fields	243
Chapter IX. Applications of Incomplete Cylindrical Functions to some Problems of Atomic and Nuclear Physics	249
 Solution of a Particular Form of the Schrödinger Equation Some Relations for Evaluating the Transparency Coefficients of Nuclei and the Average Loss of Impulse for Interaction of Particles with their 	249
Fields	253 256
Heterogeneous Reactor with Small Number of Blocks	262 267
Chapter X. Other Applied Problems Leading to Incomplete Cylindrical Functions	274
1. Excitation of Betatron Oscillations	279 280 282 283
Chapter XI. Compendium of Tables and Computation Formulae for Evaluation of Incomplete Cylindrical Functions	288
 Incomplete Bessel Functions, Struve Functions, Anger Functions, and Weber Functions. Incomplete Hankel Functions and MacDonald Functions. Incomplete Lipschitz-Hankel Integrals. Incomplete Weber Integrals. Tables of Incomplete Cylindrical Functions. 	291 292 294
Bibliography	324
Author Index	
Subject Index	329

