

1. Record Nr.	UNINA9910831058803321
Autore	Idemen M. Mithat
Titolo	Discontinuities in the electromagnetic field / / M. Mithat Idemen
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley-IEEE Press, , c2011 [Piscataqay, New Jersey] : , : IEEE Xplore, , [2011]
ISBN	1-283-17590-8 9786613175908 1-118-05791-0 1-118-05790-2
Descrizione fisica	1 online resource (240 p.)
Collana	IEEE Press series on electromagnetic wave theory ; ; 40
Classificazione	SCI022000
Disciplina	530.14/1 621.3
Soggetti	Electromagnetic fields - Mathematics Maxwell equations Electromagnetic waves
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface ix -- 1. Introduction 1 -- 2. Distributions and Derivatives in the Sense of Distribution 7 -- 2.1 Functions and Distributions, 7 -- 2.2 Test Functions. The Space C^{∞}_0 , 9 -- 2.3 Convergence in D , 14 -- 2.4 Distribution, 16 -- 2.5 Some Simple Operations in D , 21 -- 2.5.1 Multiplication by a Real Number or a Function, 21 -- 2.5.2 Translation and Rescaling, 21 -- 2.5.3 Derivation of a Distribution, 22 -- 2.6 Order of a Distribution, 26 -- 2.7 The Support of a Distribution, 31 -- 2.8 Some Generalizations, 33 -- 2.8.1 Distributions on Multidimensional Spaces, 33 -- 2.8.2 Vector-Valued Distributions, 38 -- 3. Maxwell Equations in the Sense of Distribution 49 -- 3.1 Maxwell Equations Reduced into the Vacuum, 49 -- 3.1.1 Some Simple Examples, 53 -- 3.2 Universal Boundary Conditions and Compatibility Relations, 54 -- 3.2.1 An Example. Discontinuities on a Combined Sheet, 57 -- 3.3 The Concept of Material Sheet, 59 -- 3.4 The Case of Monochromatic Fields, 62 -- 3.4.1 Discontinuities on the Interface Between Two -- Simple Media that Are at Rest, 64 -- 4. Boundary Conditions on Material Sheets at Rest 67 -- 4.1 Universal Boundary

Conditions and Compatibility Relations for a Fixed Material Sheet, 67 -- 4.2 Some General Results, 69 -- 4.3 Some Particular Cases, 70 -- 4.3.1 Planar Material Sheet Between Two Simple Media, 70 -- 4.3.2 Cylindrically or Spherically Curved Material Sheet Located Between Two Simple Media, 91 -- 4.3.3 Conical Material Sheet Located Between Two Simple Media, 93 -- 5. Discontinuities on a Moving Sheet 109 -- 5.1 Special Theory of Relativity, 110 -- 5.1.1 The Field Created by a Uniformly Moving Point Charge, 112 -- 5.1.2 The Expressions of the Field in a Reference System Attached to the Charged Particle, 114 -- 5.1.3 Lorentz Transformation Formulas, 115 -- 5.1.4 Transformation of the Electromagnetic Field, 118 -- 5.2 Discontinuities on a Uniformly Moving Surface, 120 -- 5.2.1 Transformation of the Universal Boundary Conditions, 123 -- 5.2.2 Transformation of the Compatibility Relations, 126. 5.2.3 Some Simple Examples, 126 -- 5.3 Discontinuities on a Nonuniformly Moving Sheet, 138 -- 5.3.1 Boundary Conditions on a Plane that Moves in a Direction Normal to Itself, 139 -- 5.3.2 Boundary Conditions on the Interface of Two Simple Media, 143 -- 6. Edge Singularities on Material Wedges Bounded by Plane Boundaries 149 -- 6.1 Introduction, 149 -- 6.2 Singularities at the Edges of Material Wedges, 153 -- 6.3 The Wedge with Penetrable Boundaries, 154 -- 6.3.1 The H Case, 156 -- 6.3.2 The E Case, 171 -- 6.4 The Wedge with Impenetrable Boundaries, 174 -- 6.5 Examples. Application to Half-Planes, 175 -- 6.6 Edge Conditions for the Induced Surface Currents, 176 -- 7. Tip Singularities at the Apex of a Material Cone 179 -- 7.1 Introduction, 179 -- 7.2 Algebraic Singularities of an H-Type Field, 185 -- 7.2.1 Contribution of the Energy Restriction, 185 -- 7.2.2 Contribution of the Boundary Conditions, 186 -- 7.3 Algebraic Singularities of an E-Type Field, 191 -- 7.4 The Case of Impenetrable Cones, 193 -- 7.5 Confluence and Logarithmic Singularities, 195 -- 7.6 Application to some Widely used Actual Boundary Conditions, 197 -- 7.7 Numerical Solutions of the Transcendental Equations Satisfied by the Minimal Index, 200 -- 7.7.1 The Case of Very Sharp Tip, 200 -- 7.7.2 The Case of Real-Valued Minimal ν , 201 -- 7.7.3 A Function-Theoretic Method to Determine Numerically the Minimal ν , 203 -- 8. Temporal Discontinuities 209 -- 8.1 Universal Initial Conditions, 209 -- 8.2 Linear Mediums in the Generalized Sense, 211 -- 8.3 An Illustrative Example, 212 -- References 215 -- Index 219 -- IEEE Press Series on Electromagnetic Wave Theory.

Sommario/riassunto

"This book presents some new approaches and basic results connected with the discontinuities of the electromagnetic field. The discontinuities in question may be (1) the bounded jump discontinuities on the interfaces between two media or on the material sheets which model very thin layers or (2) unbounded values at the edge of wedge type structures or (3) unbounded values at the tips of conical structures. The book involves many examples as well as problems (exercises) to be solved by the readers"--
