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Nota di contenuto	METHODS OF MATHEMATICAL PHYSICS; CONTENTS; I . Introductory Remarks; 1 . General Information about the Variety of Solutions; 1 . Examples; 2 . Differential Equations for Given Families of Functions; 2 . Systems of Differential Equations; 1 . The Question of Equivalence of a System of Differential Equations and a Single Differential Equation; 2 . Elimination from a Linear System with Constant Coefficients; 3 . Determined, Overdetermined, Underdetermined Systems; 3 . Methods of Integration for Special Differential Equations; 1 . Separation of Variables 2 . Construction of Further Solutions by Superposition . Fundamental Solution of the Heat Equation . Poisson's Integral4 . Geometric Interpretation of a First Order Partial Differential Equation in Two Independent Variables . The Complete Integral; 1 . Geometric Interpretation of a First Order Partial Differential Equation in Two Independent Variables. The Complete Integral; 2 . The Complete Integral; 3 . Singular Integrals; 4 . Examples; 5 . Theory of Linear and Quasi-Linear Differential Equations of First Order; 1 . Linear Differential Equations; 2 . Quasi-Linear Differential Equations 6 . The Legendre Transformation1 . The Legendre Transformation for

Functions of Two Variables; 2 . The Legendre Transformation for Functions of n Variables; 3 . Application of the Legendre Transformation to Partial Differential Equations; 7 . The Existence Theorem of Cauchy and Kowalewsky; 1 . Introduction and Examples; 2 . Reduction to a System of Quasi-Linear Differential Equations; 3 . Determination of Derivatives Along the Initial Manifold; 4 . Existence Proof for Solutions of Analytic Differential Equations; 4a . Observation About Linear Differential Equations
 4b. Remark About Nonanalytic Differential Equations
 5. Remarks on Critical Initial Data. Characteristics; Appendix 1 to Chapter I . Laplace's Differential Equation for the Support Function of a Minimal Surface; Appendix 2 to Chapter I . Systems of Differential Equations of First Order and Differential Equations of Higher Order; 1. Plausibility Considerations; 2. Conditions of Equivalence for Systems of Two First Order Partial Differential Equations and a Differential Equation of Second Order; II. General Theory of Partial Differential Equations of First Order
 1. Geometric Theory of Quasi-Linear Differential Equations in Two Independent Variables
 1. Characteristic Curves; 2. Initial Value Problem; 3. Examples; 2. Quasi-Linear Differential Equations in n Independent Variables; 3. General Differential Equations in Two Independent Variables; 1. Characteristic Curves and Focal Curves. The Monge Cone; 2. Solution of the Initial Value Problem; 3. Characteristics as Branch Elements. Supplementary Integral Conoid. Caustics; 4. The Complete Integral; 5. Focal Curves and the Monge Equation; 6. Examples
 1. The Differential Equation of Straight Light Rays, $(\text{grad } u)^2 = 1$

Sommario/riassunto

Since the first volume of this work came out in Germany in 1937, this book, together with its first volume, has remained standard in the field. Courant and Hilbert's treatment restores the historically deep connections between physical intuition and mathematical development, providing the reader with a unified approach to mathematical physics. The present volume represents Richard Courant's final revision of 1961.
