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Nota di contenuto	Title Page; Copyright Page; Dedication; Table of Contents; Foreword; Preface; 1 - Prolegomena; 1. The Science of the Probable and the Random Field Model; 2. The Physical Significance of the Random Field Model; 3. The Mathematics of Random Fields; 4. The Philosophical Theses of the Stochastic Research Program; 5. The Practice of the Stochastic Research Program and the Spectrum of Its Applications; 2 - The Spatial Random Field Model; 1. Introduction; 2. Basic Notions; 3. Characterization of Spatial Random Fields by Means of Their Second-Order Statistical Moments-Correlation Theory 4. Certain Geometrical Properties of Spatial Random Fields 5. Spectral Characteristics of Spatial Random Fields 6. Auxiliary Hypotheses 7. Homogeneous Spatial Random Fields 8. Isotropic Spatial Random Fields 9. Scales of Spatial Correlation 10. Relationships between the Spatial and the Frequency Domains-The Uncertainty Principle 11. Spatial Random Fields with Homogeneous Increments 12. On the Ergodicity Hypotheses of Spatial Random Fields 13. Information and Entropy of Spatial Random Fields 3 - The Intrinsic Spatial Random Field Model; 1. Introduction

2. Generalized Spatial Random Fields3. Spatial Random Fields with Space Homogeneous Increments or Intrinsic Spatial Random Fields; 4. Discrete Linear Representations of Spatial Random Fields; 5. Stochastic Differential and Difference Equations; 4 - The Factorable Random Field Model; 1. Introduction; 2. The Theory of Factorable Random Fields; 3. Nonlinear Transformations of Factorable Random Fields; 4. Construction of Factorable Random Fields; 5. The Nonlinear State-Nonlinear Observation System; 5 - The Spatiotemporal Random Field Model; 1. Introduction

2. Spatiotemporal Natural Processes-A Review3. Ordinary Spatiotemporal Random Fields; 4. Generalized Spatiotemporal Random Fields; 5. Spatiotemporal Random Fields of Order /, (Ordinary and Generalized); 6. Stochastic Partial Differential Equations; 7. Discrete Linear Representations of Spatiotemporal Random Fields; 6 - Space Transformations of Random Fields; 1. Introduction; 2. Space Transformations; 3. Space Transformation Representations of Spatial Random Fields; 4. Stochastic Differential Equation Models; 5. Criteria of Permissibility; 7 - Random Field Modeling of Natural Processes

1. Introduction2. Descriptive Features of Natural Processes and the Basic Working Hypotheses; 3. Duality Relations between the Natural Process and the Spatial Random Field Model-Examples from the Geosciences; 4. Certain Practical Aspects of Spatial and Temporal Variability Characterization; 5. Qualitative (Soft) Information; 6. Some Final Comments about the Stochastic Research Program; 8 - Simulation of Natural Processes; 1. Introduction; 2. The Physical Significance of Simulation; 3. Simulation of Random Fields; 4. Simulation of Spatial Random Field by Space Transformations-Examples

5. Techniques of One-Dimensional Simulation

Sommario/riassunto

This graduate-level text surveys the problems of earth and environmental sciences by means of theoretical models that have as an essential basis a purely random element. In addition to introducing students to spatiotemporal modeling as a fundamental methodology in the earth sciences, this volume illustrates the role of spatiotemporal modeling in the general framework of the scientific method. Starting with discussions of the science of the probable, the various theories of probability, and the physical significance of the random field model, the text explores a variety of problems in earth sci
