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| Nota di contenuto | Environmental Fate Modelling of Pesticides; Contents; 1 Introduction; 2 Mathematical Preliminaries; 2.1 Ordinary Differential Equations; 2.2 Partial Differential Equations; 2.3 Geostatistics; 3 Kinetics; 3.1 Linear Models; 3.1.1 The Compartment Concept; 3.1.2 Simple Linear Systems; 3.1.3 Solution by Matrix Methods; 3.1.4 Solution by Laplace Transformation; 3.2 Nonlinear Models; 3.2.1 The Limits of Linear Models; 3.2.2 Nonlinear Kinetics due to Adsorption; 3.2.2.1 Equilibrium Approach; 3.2.2.2 Kinetic Approach; 3.2.3 Nonlinearities due to Spatial Heterogeneity 3.2.4 Nonlinearities Encountered in Biological Degradation3.2.4.1 Capacity Limited Degradation; 3.2.4.2 Substrate Inhibition; 3.2.4.3 Population Dynamic Effects; 3.2.4.4 Long Term Persistence of Activity; 3.2.4.5 Stochastic Approach for Activity Life Times; 3.2.4.6 Shift of Population Composition; 3.2.4.7 Interactions; 3.3 Kinetics of Dose-Response; 3.3.1 Linking Concentration and Effect; 3.3.2 Mathematical Form of Dose-Response-Curves; 3.3.3 Time Courses of the Response; |

3.3.4 Optimal Application Schedules; 3.4 Environmental Covariates; 3.4.1 Temperature and Humidity 3.4.1.1 Chemical and Biological Temperature Response-Functions3.4.1.2 Influence of the Time Resolution of Temperature Pattern on the Kinetics; 3.4.1.3 Influence of the Response-Function on Degradation; 3.4.1.4 Humidity; 3.4.1.5 Combined Effect of Temperature and Humidity; 3.4.2 Soil Parameters; 3.4.2.1 Organic Matter Content; 3.4.2.2 pH-Value; 3.4.2.3 Combined Effect of Organic Matter Content and pH-Value; 4 Parameter Estimation in Kinetic Models; 4.1 Problem Statement; 4.1.1 The Estimation Problem; 4.1.2 Performance Criteria of the Estimates and Experimental Design 4.1.3 Multi-Experiment Problems4.2 Models in Explicit Form; 4.2.1 A Multicompartment System; 4.2.2 Strong Sorption and Degradation; 4.3 Models in Form of Ordinary Differential Equations; 4.3.1 Initial Value Method; 4.3.2 Boundary Value Method; 4.4 Sparse Data Analysis; 5 Transport and Reactions in the Soil; 5.1 Water Movement; 5.1.1 The Classical Approach: Richards' Equation; 5.1.2 Two-Region Models; 5.2 Applications of the Convection Dispersion Equation; 5.2.1 Derivation of the Convection Dispersion Equation; 5.2.2 Analytical Solutions in the One-Dimensional Case 5.2.3 Linear Sorption and First Order Degradation5.2.4 Volatilization; 5.2.5 Kinetic Adsorption; 5.2.6 Two-Region Transport Model; 5.2.7 Three-Dimensional Form of the Convection Dispersion Equation; 5.3 Coupling of Nonlinear Kinetics and Transport; 5.3.1 Nonlinear Sorption; 5.3.2 Coupling Transport and Microbial Population Dynamics; 5.3.3 Soil Aggregate Model; 5.3.4 Metabolites; 5.4 Soil Temperature Fields; 5.4.1 The Heat Conduction Equation; 5.4.2 Influence of the Temperature Field on Degradation and Transport; 6 Parameters for Water Transport Models 6.1 Pedotransfer Functions for Water Retention Curves and Saturated Hydraulic Conductivities

Sommario/riassunto

This book is concerned with modelling the fate of organic substances in the soil. Once a chemical enters the soil it is subject to various transformation processes. It partitions between the liquid, solid and gaseous phase, it is sorbed to different binding sites with a different strength of bonding, it may decay by a simple chemical process or it may be transformed by microorganisms. Solute transport through soil and subsurface is mediated by water flow and is strongly influenced by solute sorption. To complicate matters, soil structures are heterogeneous. All these processes are embedded in
