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Nota di contenuto	Spatial Ecology via Reaction-Diffusion Equations; Contents; Preface; Series Preface; 1 Introduction; 1.1 Introductory Remarks; 1.2 Nonspatial Models for a Single Species; 1.3 Nonspatial Models For Interacting Species; 1.3.1 Mass-Action and Lotka-Volterra Models; 1.3.2 Beyond Mass-Action: The Functional Response; 1.4 Spatial Models: A General Overview; 1.5 Reaction-Diffusion Models; 1.5.1 Deriving Diffusion Models; 1.5.2 Diffusion Models Via Interacting Particle Systems: The Importance of Being Smooth; 1.5.3 What Can Reaction-Diffusion Models Tell Us? 1.5.4 Edges, Boundary Conditions, and Environmental Heterogeneity 1.6 Mathematical Background; 1.6.1 Dynamical Systems; 1.6.2 Basic Concepts in Partial Differential Equations: An Example; 1.6.3 Modern Approaches to Partial Differential Equations: Analogies with Linear Algebra and Matrix Theory; 1.6.4 Elliptic Operators: Weak Solutions,

State Spaces, and Mapping Properties; 1.6.5 Reaction-Diffusion Models as Dynamical Systems; 1.6.6 Classical Regularity Theory for Parabolic Equations; 1.6.7 Maximum Principles and Monotonicity

2 Linear Growth Models for a Single Species: Averaging Spatial Effects Via Eigenvalues 2.1 Eigenvalues, Persistence, and Scaling in Simple Models; 2.1.1 An Application: Species-Area Relations; 2.2 Variational Formulations of Eigenvalues: Accounting for Heterogeneity; 2.3 Effects of Fragmentation and Advection/Taxis in Simple Linear Models; 2.3.1 Fragmentation; 2.3.2 Advection/Taxis; 2.4 Graphical Analysis in One Space Dimension; 2.4.1 The Best Location for a Favorable Habitat Patch; 2.4.2 Effects of Buffer Zones and Boundary Behavior; 2.5 Eigenvalues and Positivity; 2.5.1 Advective Models

2.5.2 Time Periodicity 2.5.3 Additional Results on Eigenvalues and Positivity; 2.6 Connections with Other Topics and Models; 2.6.1 Eigenvalues, Solvability, and Multiplicity; 2.6.2 Other Model Types: Discrete Space and Time; Appendix; 3 Density Dependent Single-Species Models; 3.1 The Importance of Equilibria in Single Species Models; 3.2 Equilibria and Stability: Sub- and Supersolutions; 3.2.1 Persistence and Extinction; 3.2.2 Minimal Patch Sizes; 3.2.3 Uniqueness of Equilibria; 3.3 Equilibria and Scaling: One Space Dimension; 3.3.1 Minimum Patch Size Revisited

3.4 Continuation and Bifurcation of Equilibria 3.4.1 Continuation; 3.4.2 Bifurcation Results; 3.4.3 Discussion and Conclusions; 3.5 Applications and Properties of Single Species Models; 3.5.1 How Predator Incursions Affect Critical Patch Size; 3.5.2 Diffusion and Allee Effects; 3.5.3 Properties of Equilibria; 3.6 More General Single Species Models; Appendix; 4 Permanence; 4.1 Introduction; 4.1.1 Ecological Overview; 4.1.2 ODE Models as Examples; 4.1.3 A Little Historical Perspective; 4.2 Definition of Permanence; 4.2.1 Ecological Permanence; 4.2.2 Abstract Permanence

4.3 Techniques for Establishing Permanence

Sommario/riassunto

Many ecological phenomena may be modelled using apparently random processes involving space (and possibly time). Such phenomena are classified as spatial in their nature and include all aspects of pollution. This book addresses the problem of modelling spatial effects in ecology and population dynamics using reaction-diffusion models.* Rapidly expanding area of research for biologists and applied mathematicians* Provides a unified and coherent account of methods developed to study spatial ecology via reaction-diffusion models* Provides the reader with the tools needed to construct
