

# Table of Contents

<b>Foreword .....</b>	vii
<b>Frequently Used Notation .....</b>	ix
<b>Chapter I</b>	
<b>An Overview</b>	
I.1 Galton-Watson processes and continuous-state branching processes .....	1
I.2 Spatial branching processes and superprocesses .....	4
I.3 Quadratic branching and the Brownian snake .....	8
I.4 Some connections with partial differential equations .....	12
I.5 More general branching mechanisms .....	15
I.6 Connections with statistical mechanics and interacting particle systems .....	17
<b>Chapter II</b>	
<b>Continuous-state Branching Processes and Superprocesses</b>	
II.1 Continuous-state branching processes .....	21
II.2 Superprocesses .....	28
II.3 Some properties of superprocesses .....	34
II.4 Calculations of moments .....	38
<b>Chapter III</b>	
<b>The Genealogy of Brownian Excursions</b>	
III.1 The Itô excursion measure .....	41
III.2 Binary trees .....	42
III.3 The tree associated with an excursion .....	44
III.4 The law of the tree associated with an excursion .....	45
III.5 The normalized excursion and Aldous' continuum random tree .....	47
<b>Chapter IV</b>	
<b>The Brownian Snake and Quadratic Superprocesses</b>	
IV.1 The Brownian snake .....	53
IV.2 Finite-dimensional marginals of the Brownian snake .....	57
IV.3 The connection with superprocesses .....	59
IV.4 The case of continuous spatial motion .....	65
IV.5 Some sample path properties .....	68
IV.6 Integrated super-Brownian excursion .....	73

**Chapter V****Exit Measures and the Nonlinear Dirichlet Problem**

V.1 The construction of the exit measure .....	75
V.2 The Laplace functional of the exit measure .....	79
V.3 The probabilistic solution of the nonlinear Dirichlet problem .....	82
V.4 Moments of the exit measure .....	86

**Chapter VI****Polar Sets and Solutions with Boundary Blow-up**

VI.1 Solutions with boundary blow-up .....	89
VI.2 Polar sets .....	92
VI.3 Wiener's test for the Brownian snake .....	97
VI.4 Uniqueness of the solution with boundary blow-up .....	105

**Chapter VII****The Probabilistic Representation of Positive Solutions**

VII.1 Singular solutions and boundary polar sets .....	111
VII.2 Some properties of the exit measure from the unit disk .....	114
VII.3 The representation theorem .....	119
VII.4 Further developments .....	127

**Chapter VIII****Lévy Processes and the Genealogy of General  
Continuous-state Branching Processes**

VIII.1 The discrete setting .....	129
VIII.2 Lévy processes .....	132
VIII.3 The height process .....	134
VIII.4 The exploration process .....	136
VIII.5 Proof of Theorem 2 .....	141

<b>Bibliographical Notes .....</b>	151
------------------------------------	-----

<b>Bibliography .....</b>	155
---------------------------	-----

<b>Index .....</b>	163
--------------------	-----