

Table of Contents

Preface	ix
Introduction
I. General remarks	1
II. Notations	5
III. Lie algebras: some basics	8
Chapter 1 Operator calculus and Appell systems	
I. Boson calculus	17
II. Holomorphic canonical calculus	18
III. Canonical Appell systems	23
Chapter 2 Representations of Lie groups	
I. Coordinates on Lie groups	28
II. Dual representations	29
III. Matrix elements	37
IV. Induced representations and homogeneous spaces	40
Chapter 3 General Appell systems	
I. Convolution and stochastic processes	44
II. Stochastic processes on Lie groups	46
III. Appell systems on Lie groups	49
Chapter 4 Canonical systems in several variables	
I. Homogeneous spaces and Cartan decompositions	54
II. Induced representation and coherent states	62
III. Orthogonal polynomials in several variables	68
Chapter 5 Algebras with discrete spectrum	
I. Calculus on groups: review of the theory	83
II. Finite-difference algebra	85
III. q-HW algebra and basic hypergeometric functions	89
IV. su ₂ and Krawtchouk polynomials	93
V. e ₂ and Lommel polynomials	101
Chapter 6 Nilpotent and solvable algebras	
I. Heisenberg algebras	113
II. Type-H Lie algebras	118

III. Upper-triangular matrices	125
IV. Affine and Euclidean algebras	127
Chapter 7 Hermitian symmetric spaces	
I. Basic structures	131
II. Space of rectangular matrices	133
III. Space of skew-symmetric matrices	136
IV. Space of symmetric matrices	143
Chapter 8 Properties of matrix elements	
I. Addition formulas	147
II. Recurrences	148
III. Quotient representations and summation formulas	149
Chapter 9 Symbolic computations	
I. Computing the pi-matrices	153
II. Adjoint group	154
III. Recursive computation of matrix elements	154
IV. Symbolic computation of Appell systems	155
MAPLE output and procedures	157
References	221
Index	225