

Contents

Preface	vii
Summary of Volume 1	1
6 Twistors	43
6.1 The twistor equation and its solution space	43
6.2 Some geometrical aspects of twistor algebra	58
6.3 Twistors and angular momentum	68
6.4 Symmetric twistors and massless fields	75
6.5 Conformal Killing vectors, conserved quantities and exact sequences	82
6.6 Lie derivatives of spinors	101
6.7 Particle constants; conformally invariant operators	104
6.8 Curvature and conformal rescaling	120
6.9 Local twistors	127
6.10 Massless fields and twistor cohomology	139
7 Null congruences	169
7.1 Null congruences and spin-coefficients	169
7.2 Null-congruences and space-time curvature	182
7.3 Shear-free ray congruences	189
7.4 SFRs, twistors and ray geometry	199
8 Classification of curvature tensors	223
8.1 The null structure of the Weyl spinor	223
8.2 Representation of the Weyl spinor on S^+	226
8.3 Eigenspinors of the Weyl spinor	233
8.4 The eigenbivectors of the Weyl tensor and its Petrov classification	242
8.5 Geometry and symmetry of the Weyl curvature	246
8.6 Curvature covariants	258
8.7 A classification scheme for general spinors	265
8.8 Classification of the Ricci spinor	275

9	Conformal infinity	291
9.1	Infinity for Minkowski space	291
9.2	Compactified Minkowski space	297
9.3	Complexified compactified Minkowski space and twistor geometry	305
9.4	Twistor four-valuedness and the Grgin index	316
9.5	Cosmological models and their twistors	332
9.6	Asymptotically simple space-times	347
9.7	Peeling properties	358
9.8	The BMS group and the structure of \mathcal{I}^+	366
9.9	Energy-momentum and angular momentum	395
9.10	Bondi-Sachs mass loss and positivity	423
	Appendix: spinors in n dimensions	440
	References	465
	Subject and author index	481
	Index of symbols	499