

Contents

0. Introduction	1
1. Dimensional reduction of pure Yang-Mills theories	8
1.1. Classification of G-invariant configurations	8
1.2. Reduction of the physical action	14
1.3. Solution of the constraint equation for scalar fields	20
1.3.1. General properties of the scalar field potential	20
1.3.2. Method for calculating the potential	28
1.3.3. Irreducibility of scalar field multiplets	33
2. Dimensional reduction of gravity and spontaneous compactification	37
2.1. Classification of G-invariant configurations of Einstein-Cartan theory	37
2.2. Reduction of the gravitational action	45
2.3. Spontaneous compactification and dimensional reduction	48
2.3.1. The equations of spontaneous compactification	49
2.3.2. Solving the equations of spontaneous compactification	51
2.3.3. Problems related to spontaneous compactification	56
3. Dimensional reduction of matter fields and model building	58
3.1. Dimensional reduction of matter fields	58
3.2. The symmetry breaking scheme	63
3.3. Comments on the fermionic sector	67
3.4. Realistic models	69
References	74
Table 1	80