

THE GEOMETRY AND STRUCTURE OF ISOTROPY IRREDUCIBLE HOMOGENEOUS SPACES

BY

JOSEPH A. WOLF

University of California, Berkeley, California, U.S.A. ⁽¹⁾

To Albert M. Wolf on his sixtieth birthday

Table of Contents

Introduction	60
CHAPTER I. The structure and classification of nonsymmetric isotropy irreducible coset spaces G/K	60
1. G is a compact simple Lie group.	62
2. The case of equal ranks	64
3. The case where G is exceptional and $\text{rank } G > \text{rank } K$	66
4. The case where G is classical and K is not simple	68
5. A problem in representation theory	70
6. The case where G is unitary and K is simple	74
7. The case where G is symplectic and K is simple	79
8. The case where G is orthogonal and χ reduces	86
9. The estimate for the case where G is orthogonal with χ absolutely irreducible	91
10. The classification for the case where G is orthogonal with χ absolutely irreducible	96
11. Summary and global formulation	106
12. Extension to noncompact isotropy subgroup	116
CHAPTER II. Invariant structures on isotropy irreducible coset spaces	122
13. Complex structure	122
14. Invariant division algebras	133
CHAPTER III. Riemannian geometry on isotropy irreducible coset spaces	136
15. Curvature and equivalence	137
16. Holonomy	138
17. Isometries	140
18. Local structure	145
References	147

⁽¹⁾ Research partially supported by an Alfred P. Sloan Research Fellowship and by National Science Foundation Grant GP-5798. A major part of this research was done at the Instituto de Pesquisas Matemáticas, Universidade de São Paulo.