

李群與李代數



Sophus Lie Wilhelm Killing Elie Cartan Hermann Weyl

第一章 Basic results on Lie groups

[\[Introduction\]](#)

1.1 Lie groups and Lie algebras

[\[O\(n\) is a Lie group\]](#) [\[SO\(2\)SO\(3\)\]](#)

[\[Differential Equation\]](#) [\[Hyperbolic Plane\]](#) [\[SU\(2\)\]](#)

1.2 Lie subgroups and Lie homomorphisms

1.3 [Exponential map](#) and adjoint representation

1.4 Closed subgroups

第二章 Lie groups with bi-invariant metrics

2.1 Basic facts of Riemannian geometry

2.2 Bi-invariant metrics

2.3 Killing form and semisimple Lie algebra

2.4 Splitting Lie groups with bi-invariant metrics

[\[Iwasawa Decomposition theorem\]](#)

第三章 Proper and isometric actions

3.1 Proper actions and fiber bundles

3.2 Isometric actions and principal orbits

3.3 Orbits types

第四章 Adjoint and conjugation actions

4.1 Maximal tori , isoparametric submanifolds and polar actions

4.2 Roots of a compact Lie group

4.3 Weyl group

4.4 Normal slice of conjugation action

4.5 Dynkin diagrams

第五章 Singular Riemannian foliations with sections

5.1 Definition and first example

5.2 Holonomy and orbifolds

5.3 Surgery and suspension of homomorphisms

5.4 Result on s.r.f.s.

5.5 Transnormal maps

5.6 Recent contributions

第六章 物理上的應用

- (1) 角動量在量子力學中行為如何
- (2) 基本粒子
- (3) [規範場論](#)中的對稱性與不變量

第七章 ...

1. Lie group 理論中 李氏積關鍵性的決定了群的無窮小結構(infinitesimal structure of the group) 大域微分幾何 p.112
2. [[群表現](#)(Representation)] (數學傳播季刊 36 卷第 4 期)
3. [[Elie Cartan](#) 的故事]
4. S^0, S^1, S^3 are the only spheres which are also groups(Lie groups)
5. 何謂 E8 李群 ? [A Garrett [Lisi](#)]李斯



Topics

1. [Galois' Dream](#)
2. [E8 Lie group](#)

參考書目

1. [[Introduction](#) to Lie Groups and Lie Algebras] [Alexander Kirillov](#) Jr.
2. [[Foundations](#) of Differentiable Manifolds and Lie Groups] Frank W. Warner
3. [[Lectures on Lie Groups](#)] 項武義
4. [Lie Groups for Pedestrians](#)---on line
5. [Lie algebras for physicists] Douglas W. McKenzie [[Home](#)]
6. [Lie Groups New Research] Altos B. Canterra
關於 Clifford algebra 1990 年 David Hestenes(1933~) [Space-Time algebra]認
識到 Clifford algebra 及其在量子力學的解釋(電子自旋)
1965 年 Harry J. Lipkin(1921~) 在[Lie group for Pedestrians]中引用 Clifford
algebra
[Lie group Guide to the Universe]是 Altos B. Canterra 寫的一本小冊子 解釋李
代數在 Clifford 代數中的意義
7. [Lie Groups, Differential Equations and geometry] Giovanni Falcone