

Introduction to Lie groups

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0 Introduction

This book ... blabla ... It goes back to efforts by Sophus Lie to ... symmetry ... blabla ... It has been very fruitful for blabla... Thanks ...

1 Preliminaries

We will first define our objects of interest:

Definition 1. Let G be a topological space and $\cdot : G \times G \rightarrow G$ a 2-adic operation. We call (G, \cdot) a *Lie group* if and only if the following conditions hold:

- G is second-countable.
- There exists $n \in \mathbb{N}$ such that there exists an injective, open, continuous map $\iota : \mathbb{R}^n \rightarrow G$.
- For every $g \in G$ the map $x \mapsto g \cdot x$ is continuous and surjective.
- For every $g \in G$ the map $x \mapsto x \cdot g$ is continuous and for some $g \in G$ it is the identity.
- \cdot is associative, i. e. $x \cdot (y \cdot z) = (x \cdot y) \cdot z$ for all $x, y, z \in G$.

Lemma 1. *For every Lie group G the n in definition 1 is unique. It is called the dimension of G .*

Proof. ...

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2 Connections

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3 Lie algebras

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