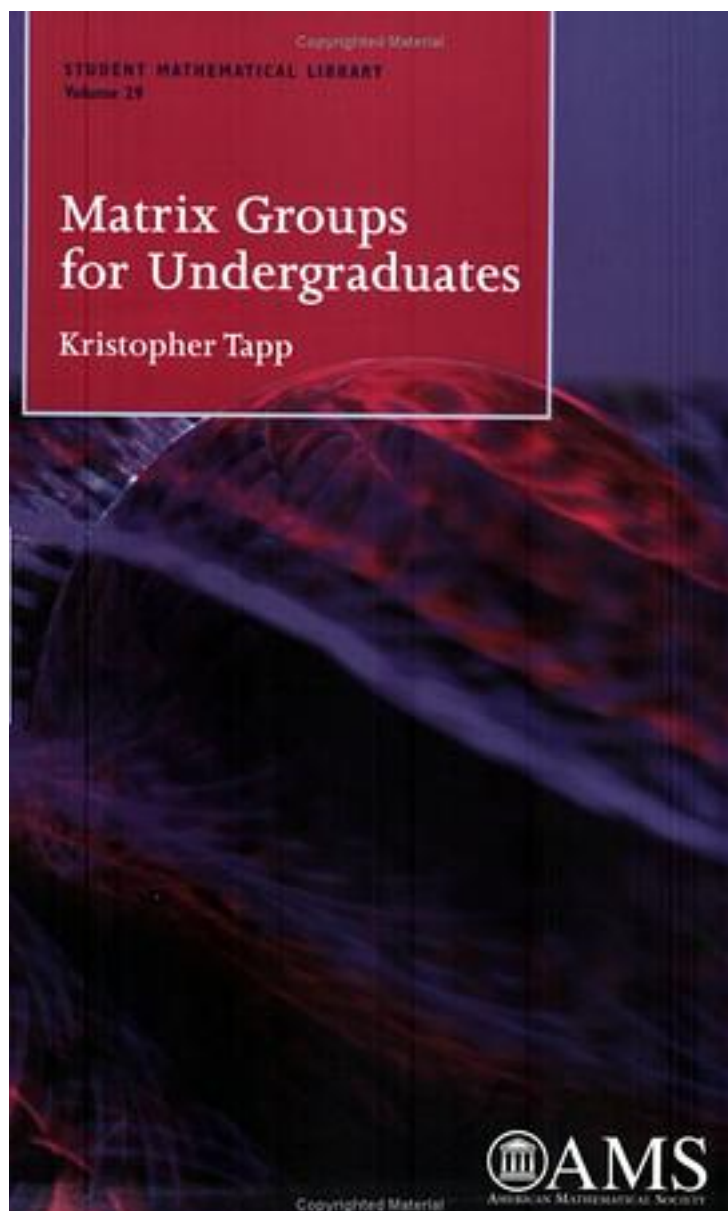


# Matrix Groups for Undergraduates



[Matrix Groups for Undergraduates 下载链接1](#)

著者:Kristopher Tapp

出版者:American Mathematical Society

出版时间:2005-6-13

装帧:Paperback

isbn:9780821837856

Matrix groups are a beautiful subject and are central to many fields in mathematics and physics. They touch upon an enormous spectrum within the mathematical arena. This textbook brings them into the undergraduate curriculum. It is excellent for a one-semester course for students familiar with linear and abstract algebra and prepares them for a graduate course on Lie groups.

Matrix Groups for Undergraduates is concrete and example-driven, with geometric motivation and rigorous proofs. The story begins and ends with the rotations of a globe. In between, the author combines rigor and intuition to describe basic objects of Lie theory: Lie algebras, matrix exponentiation, Lie brackets, and maximal tori. The volume is suitable for graduate students and researchers interested in group theory.

作者介绍:

目录: Cover 1

Title 2

Copyright 3

Contents 4

Why study matrix groups? 8

Chapter 1. Matrices 12

§ 1. Rigid motions of the sphere: a motivating example 12

§ 2. Fields and skew-fields 14

§ 3. The quaternions 15

§ 4. Matrix operations 18

§ 5. Matrices as linear transformations 22

§ 6. The general linear groups 24

§ 7. Change of basis via conjugation 25

§ 8. Exercises 27

Chapter 2. All matrix groups are real matrix groups 30

§ 1. Complex matrices as real matrices 31

§ 2. Quaternionic matrices as complex matrices 35

§ 3. Restricting to the general linear groups 37

§ 4. Exercises 39

Chapter 3. The orthogonal groups 40

§ 1. The standard inner product on  $K[\text{sup}(n)]$  40

§ 2. Several characterizations of the orthogonal groups 43

§ 3. The special orthogonal groups 46

§ 4. Low dimensional orthogonal groups 47

§ 5. Orthogonal matrices and isometries 48

§ 6. The isometry group of Euclidean space 50

§ 7. Symmetry groups 52

§ 8. Exercises 54

Chapter 4. The topology of matrix groups 58

§ 1. Open and closed sets and limit points 59

§ 2. Continuity 64

§ 3. Path-connected sets 66

§ 4. Compact sets 67

§ 5. Definition and examples of matrix groups 69

§ 6. Exercises	71
Chapter 5. Lie algebras	74
§ 1. The Lie algebra is a subspace	75
§ 2. Some examples of Lie algebras	77
§ 3. Lie algebra vectors as vector fields	80
§ 4. The Lie algebras of the orthogonal groups	82
§ 5. Exercises	84
Chapter 6. Matrix exponentiation	86
§ 1. Series in $K$	86
§ 2. Series in $M[\text{sub}(n)](K)$	89
§ 3. The best path in a matrix group	91
§ 4. Properties of the exponential map	93
§ 5. Exercises	97
Chapter 7. Matrix groups are manifolds	100
§ 1. Analysis background	101
§ 2. Proof of part (1) of Theorem 7.1	105
§ 3. Proof of part (2) of Theorem 7.1	107
§ 4. Manifolds	110
§ 5. More about manifolds	113
§ 6. Exercises	117
Chapter 8. The Lie bracket	120
§ 1. The Lie bracket	120
§ 2. The adjoint action	124
§ 3. Example: the adjoint action for $SO(3)$	127
§ 4. The adjoint action for compact matrix groups	128
§ 5. Global conclusions	131
§ 6. The double cover $Sp(1) \rightarrow SO(3)$	133
§ 7. Other double covers	137
§ 8. Exercises	138
Chapter 9. Maximal tori	142
§ 1. Several characterizations of a torus	143
§ 2. The standard maximal torus and center of $SO(n)$ , $SU(n)$ , $U(n)$ and $Sp(n)$	147
§ 3. Conjugates of a maximal torus	152
§ 4. The Lie algebra of a maximal torus	159
§ 5. The shape of $SO(3)$	161
§ 6. The rank of a compact matrix group	162
§ 7. Who commutes with whom?	164
§ 8. The classification of compact matrix groups	165
§ 9. Lie groups	166
§ 10. Exercises	167
Bibliography	170
Index	172
A	172
B	172
C	172
D	172
E	172
F	172
G	172
H	172
I	173
L	173
M	173
N	173

O 173  
P 173  
Q 173  
R 173  
S 173  
T 173  
U 173  
V 173  
Back Cover 176  
• • • • • ([收起](#))

[Matrix Groups for Undergraduates\\_ 下载链接1](#)

标签

数学

其余代数7

for

Undergraduates

Spy

Matrix

Groups

评论

通俗易懂，脉络清晰

-----  
[Matrix Groups for Undergraduates\\_ 下载链接1](#)

书评

-----  
[Matrix Groups for Undergraduates\\_下载链接1](#)