

Index

A

- Abelian Groups *p.24*
- Adjoint Operators *pp.43 – 44, 87, 103*
- Affine Spaces *p.93*
- Autonomous Systems *p.7*

B

- Bifurcation *pp.11 – 12, 63 – 64*
- Body Velocity *p.38*

C

- Centroid of Area *pp.4 – 6*
- Connection Vector Field *pp.118 – 119*
- Conservative Vector Fields *pp.145 – 146*
- Constraint, Holonomic *pp.76 – 77*
- Constraint, Nonholonomic *pp.110 – 117, 135 – 136*
- Cotangent Bundle *p.126*
- Cotangent Space *p.126*
- Cotangent Vector *pp.127 – 130*
- Cross Product *pp.1 – 2*
- Curl (Vector) *p.145*
- Curvature (Constraint) *pp.144 – 145*

D

- Degrees of Freedom *p.17*
- Diffeomorphic *p.20*
- Direct Product of Two Sets *p.20*
- Direct Sum *p.20*
- Direct Sum of Two Sets *p.125*
- Directional Linearity *p.106*
- Distribution (Allowable Velocities) *pp.112, 148 – 150*

E

- Embedding *p.96*
- Equivalent Vectors w.r.t. Functions *pp.100 – 101*
- Euler Lagrange Equation *p.136*
- Existence And Uniqueness Theorem *pp.11, 13*
- Exponential Map *pp.48 – 51, 103 – 104*
- External Forces *p.1*

F

- Force Couple *p.2*
- Force Couple System *p.3*
- Forward Kinematics *pp.78, 83 – 84*
- Fundamental Vector Field (Infinitesimal Generators) *pp.99 – 100*

G

- Gait Generation *p.124*
- Generalized Coordinates *p.78*
- Geodesics *pp.44 – 46, 51, 96 – 99*
- Gradient Vector Field *pp.129 – 130*

Group	<i>pp.</i> 21, 94 – 95
Group Invariant Vectors	<i>p.</i> 100
Group, Left/right Action	<i>pp.</i> 24 – 29, 33, 80, 96, 137
Group, Symmetry	<i>pp.</i> 108 – 109, 137
<i>H</i>	
Holonomic Constraint	<i>pp.</i> 76 – 77
Homeomorphic	<i>p.</i> 19
Hysteresis	<i>pp.</i> 66, 70 – 71
<i>I</i>	
Image (Algebra)	<i>p.</i> 124
Internal Forces	<i>p.</i> 1
Invariance	<i>p.</i> 139
Isomorphic	<i>p.</i> 22
<i>J</i>	
Jacobian	<i>pp.</i> 84 – 86
<i>K</i>	
Kernel	<i>pp.</i> 124 – 125
Kinematic Locomotion	<i>pp.</i> 105 – 107
<i>L</i>	
Lie Algebra	<i>pp.</i> 41, 98 – 100, 103, 151 – 152
Lie Bracket	<i>pp.</i> 148 – 150
Lie Groups	<i>pp.</i> 21, 96 – 99
Lifted Actions	<i>pp.</i> 31 – 42, 52 – 54, 85, 137 – 138
Linearity (Mapping)	<i>pp.</i> 106 – 107
Linearization at a Fixed Point	<i>pp.</i> 10 – 11
Local Connection	<i>pp.</i> 114 – 117, 120, 122 – 123, 130, 142
Locomotion	<i>p.</i> 104
<i>M</i>	
Manifolds	<i>pp.</i> 17 – 19, 93
Manifolds, Accessible	<i>pp.</i> 76 – 78
Manifolds, C^k Differentiable	<i>p.</i> 20
Manifolds, Curvature	<i>p.</i> 93
Manifolds, Topology	<i>p.</i> 93
Modular Addition	<i>p.</i> 21
Momentum	<i>pp.</i> 138 – 140
Monotonic Function	<i>p.</i> 13
Multiplicative Calculus	<i>pp.</i> 34 – 38, 46 – 47
<i>N</i>	
Noether's Theorem	<i>pp.</i> 131 – 134
Noncommutativity	<i>p.</i> 147
Nonconservativity	<i>pp.</i> 145 – 147
Nonholonomic Constraint	<i>pp.</i> 110 – 117, 135 – 136
<i>O</i>	
One Form	<i>pp.</i> 125, 127 – 129
Optimal Frame	<i>p.</i> 83
<i>P</i>	
Pfaffian Constraint	<i>pp.</i> 111 – 117

Phase Portrait	<i>pp.</i> 7 – 9
Position Trajectory	<i>p.</i> 105
Potentials	<i>p.</i> 17
Preimage (Algebra)	<i>p.</i> 124
Principally Kinematic System	<i>p.</i> 139
Principle of Least Action	<i>pp.</i> 131 – 133
<i>R</i>	
Reaction Force	<i>p.</i> 4
Reconstruction Equation	<i>pp.</i> 114 – 123, 138
Rigid Body	<i>p.</i> 23
Rigid Body, Left Lifted Action	<i>pp.</i> 38 – 41
Rigid Body, Right Lifted Action	<i>pp.</i> 41 – 43
<i>S</i>	
Semidirect Product of Two Sets	<i>p.</i> 24
Shape Trajectory	<i>p.</i> 105
Spatial Velocity	<i>pp.</i> 43, 85
Special Euclidean Group	<i>p.</i> 23
Special Orthogonal Group, $so(N)$	<i>p.</i> 22
Symmetry	<i>pp.</i> 108 – 109, 131
<i>T</i>	
Tangent Spaces	<i>pp.</i> 29 – 30
Tensor Product	<i>p.</i> 20
<i>U</i>	
Underactuated System	<i>p.</i> 104
<i>V</i>	
Varignon's Theorem	<i>p.</i> 1
Vector Field	<i>pp.</i> 30 – 31
Vertical Space	<i>p.</i> 125
<i>W</i>	
Work (Mechanical)	<i>p.</i> 145
<i>Z</i>	
Zero Set	<i>pp.</i> 76, 110 – 111