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4.6 PV (Proper Velocity) Gyrotransformation Groups; 4.7 Galilei Transformation Groups; 4.8 From Gyroboosts to Boosts; 4.9 The Lorentz Boost; 4.10 The $(p : q)$ -Gyromidpoint; 4.11 The $(p_1 : p_2 : \dots : p_n)$ -Gyromidpoint; 5. Gyrovectors and Cogrovectors; 5.1 Equivalence Classes; 5.2 Gyrovectors; 5.3 Gyrovector Translation; 5.4 Gyrovector Translation Composition; 5.5 Points and Gyrovectors; 5.6 The Gyroparallelogram Addition Law; 5.7 Cogrovectors; 5.8 Cogrovector Translation; 5.9 Cogrovector Translation Composition; 5.10 Points and Cogrovectors; 5.11 Exercises; 6. Gyrovector Spaces; 6.1 Definition and First Gyrovector Space Theorems; 6.2 Solving a System of Two Equations in a Gyrovector Space; 6.3 Gyrolines and Cogyrolines; 6.4 Gyrolines; 6.5 Gyromidpoints; 6.6 Gyrocovariance; 6.7 Gyroparallelograms; 6.8 Gyrogeodesics; 6.9 Cogyrolines; 6.10 Carrier Cogyrolines of Cogrovectors; 6.11 Cogyromidpoints; 6.12 Cogyrogeodesics; 6.13 Various Gyrolines and Cancellation Laws; 6.14 M obius Gyrovector Spaces; 6.15 M obius Cogyroline Parallelism; 6.16 Illustrating the Gyroline Gyration Transitive Law; 6.17 Turning the M obius Gyrometric into the Poincar e Metric; 6.18 Einstein Gyrovector Spaces; 6.19 Turning Einstein Gyrometric into a Metric; 6.20 PV(Proper Velocity) Gyrovector Spaces; 6.21 Gyrovector Space Isomorphisms; 6.22 Gyrotriangle Gyromedians and Gyrocentroids; 6.22.1 In Einstein Gyrovector Spaces; 6.22.2 In M obius Gyrovector Spaces; 6.22.3 In PV Gyrovector Spaces; 6.23 Exercises; 7. Rudiments of Differential Geometry; 7.1 The Riemannian Line Element of Euclidean Metric; 7.2 The Gyroline and the Cogyroline Element; 7.3 The Gyroline Element of M obius Gyrovector Spaces; 7.4 The Cogyroline Element of M obius Gyrovector Spaces

Sommario/riassunto

This book presents a powerful way to study Einstein's special theory of relativity and its underlying hyperbolic geometry in which analogies with classical results form the right tool. It introduces the notion of vectors into analytic hyperbolic geometry, where they are called *gyrovectors*. Newtonian velocity addition is the common vector addition, which is both commutative and associative. The resulting vector spaces, in turn, form the algebraic setting for the standard model of Euclidean geometry. In full analogy, Einsteinian velocity addition is a gyrovector addition, which is both
