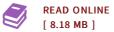# Computational Geometry of Positive Definite Quadratic Forms: Polyhedral Reduction Theories, Algorithms, and Applications

By Achill Schurmann

American Mathematical Society. Paperback. Book Condition: new. BRAND NEW, Computational Geometry of Positive Definite Quadratic Forms: Polyhedral Reduction Theories, Algorithms, and Applications, Achill Schurmann, Starting from classical arithmetical questions on quadratic forms, this book takes the reader step by step through the connections with lattice sphere packing and covering problems. As a model for polyhedral reduction theories of positive definite quadratic forms, Minkowski's classical theory is presented, including an application to multidimensional continued fraction expansions. The reduction theories of Voronoi are described in great detail, including full proofs, new views, and generalizations that cannot be found elsewhere. Based on Voronoi's second reduction theory, the local analysis of sphere coverings and several of its applications are presented. These include the classification of totally real thin number fields, connections to the Minkowski conjecture, and the discovery of new, sometimes surprising, properties of exceptional structures such as the Leech lattice or the root lattices. Throughout this book, special attention is paid to algorithms and computability, allowing computer-assisted treatments. Although dealing with relatively classical topics that have been worked on extensively by numerous authors, this book is exemplary in showing how computers may help to gain new insights.

READ ONLINE
[8.18 MB]

Reviews