

Counting Algebraic Integers and Coding over Fading Channels

Lattices which arise from totally real algebraic number fields have many applications to the coding theory of fading channels, which arise naturally in the context of wireless communications. One can naturally attach to the ring of integers of a number field K of degree n over \mathbf{Q} a lattice in \mathbf{R}^n , from which one can carve a finite codebook in a natural way. We will show how familiar number theoretic invariants of K , such as its regulator and values of its Dedekind zeta function, control the probability that the corresponding codebook provides reliable transmission over a fading channel.