Mathematics > K-Theory and Homology

The KH-Theory of Complete Simplicial Toric Varieties and the Algebraic K-Theory of Weighted Projective Spaces

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We show that, for a complete simplicial toric variety X, we can determine its homotopy $\K$-theory (denoted $\KH$-theory) entirely in terms of the torus pieces of open sets forming an open cover of X. We accomplish this by constructing a simplicial scheme $\BOT_{X}$ and constructing a relationship between the spectrum $\KH(X)$ and a certain spectrum determined by $\BOT_{X}$. We then construct conditions under which, given two complete simplicial toric varieties with the same simplicial structure, the two spectra $\KH(X) \otimes \Q$ and $\KH(Y) \otimes \Q$ are weakly equivalent. We apply this result to determine the rational $\KH$-theory of weighted projective spaces. We next examine $\K$-regularity for complete toric surfaces; in particular, we show that complete toric surfaces (and therefore 2-dimensional weighted projective spaces) are $\K_{0}$-regular. We then determine conditions under which our approach for dimension 2 works in arbitrary dimensions, before demonstrating that weighted projective spaces are not $\K_{1}$-regular, and for dimensions bigger than 2 are also not in general $\K_{0}$-regular.

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