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Algebra over polynomial rings with real exponents

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Abstract

Little has been known about the algebra of rings of polynomials whose exponents are allowed to be nonnegative real numbers instead of integers. The extreme failure of the noetherian condition – ideals can be uncountably generated – and the nontrivial topology on the set of exponents present daunting technical difficulties. This talk describes research [arXiv:2008.03819] breaking ground on the study of modules over real-exponent polynomial rings, with a focus on monomial ideals and multigraded modules. These are general enough to exhibit the starkly different behavior resulting from continuous exponents and deviation from noetherianity but have enough combinatorial structure to allow complete treatment of basic theory, such as primary decomposition, Nakayama's lemma, and minimal presentations.

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