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Factorization Properties of Root-Closed Puiseux Algebras

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Abstract

The study of atomicity and related factorization properties of **Puiseux** algebras $K[M]$ ($M \subseteq \mathbb{Q}_+$) (cancellative and torsion-free) is central in factorization theory [1].

We focus on **root-closed Puiseux** monoids and show that root-closedness allows one to reduce several factorization questions in $K[M]$ to corresponding problems in the classical polynomial ring $K[M][2]$.

Using this reduction, we obtain practical irreducibility criteria, control the behavior of (generalized) cyclotomic polynomials in $K[M][3]$, and study the irreducible-divisors-finite (**IDF**) property [4].

In particular, when K is a finitely generated field and M is root-closed, we prove that $K[M]$ is an **IDF** domain, extending techniques for polynomials of $K[\mathbb{Q}_+]$ [5].

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