

ON THE STRUCTURE OF CERTAIN VALUED FIELDS

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A. Mactintyre asked whether two complete local noetherian rings are isomorphic if their n -th residue rings are isomorphic for each n , where the n -th residue ring of a local ring is the quotient of the ring by the n -th power of the maximal ideal. L. van den Dries answered this question positively for the case that residue fields are algebraic extensions of prime fields. In general, this question fails by O. Gabber's example.

In this talk, we give a positive answer for complete discrete valuation rings of mixed characteristic having perfect residue fields. More precisely, we show that there is a positive integer N , depending only on the ramification index, such that any homomorphism of the N -th residue rings of given complete discrete valuation rings of mixed characteristic having perfect residue fields can be lifted to a homomorphism of the valuation rings. From this lifting process, after fixing a prime number p , for positive integer e , there is a positive integer N such that there is a functor from the category of truncated discrete valuation rings of mixed characteristic $(0, p)$ of length N having the ramification index e and perfect residue fields to the category of complete discrete valuation rings of mixed characteristic $(0, p)$ having the perfect residue fields. Note that these two categories are not equivalent. At last, using our lifting result, we improve S. A. Basarab's relative completeness theorem for finitely ramified valued fields and give a positive answer for a question posed by S. A. Basarab in the case of perfect residue fields. This is a joint work with W. Lee.

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