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On the characters ν^* and τ^* of singularities

By

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In [1], the numerical characters ν^* and τ^* of singularities were introduced and some basic theorems were proven in regards to the effect of permissible monoidal transformations on those characters under the assumption that no *inseparable* residue field extensions occur in the monoidal transformations. They are, of course, satisfactory in the study of singularities of algebraic schemes in which the residue fields have characteristic zero, and played a role of vital importance in the resolution of singularities in characteristic zero. Inseparable residue field extensions are, however, inevitable in the monoidal transformations of algebraic schemes over fields of positive characteristics or over the ring of integers. As was done in [1], if only separable residue field extensions are involved, many of the theorems about the behavior of ν^* and τ^* can be reduced to the case of trivial residue field extensions. Namely, we replace the given scheme by suitable local etale coverings. This approach fails completely if an inseparable residue field extension is involved, and, as is done in this paper, an essentially different approach must be taken. At one crucial point, I make use of Hasse differentiations. This was inspired by [2], Proof of Lemma 7.1, p. 486. In a subsequent paper, the theorems of this paper will play important roles in proving the resolution of singularities of an arbitrary excellent schemes of dimension 2 by means of quadratic and permissible monoidal transformations.

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