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THE CORESTRICTION OF VALUED DIVISION ALGEBRAS OVER HENSELIAN FIELDS I

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When L/F is an unramified extension of Henselian fields, we analyze the underlying division algebra ${}^cD$ of the corestriction $\mathrm{cor}_{L/F}(D)$ of a tame division algebra D over L with respect to the unique valuations on ${}^cD$ and D extending the valuations on F and L. We show that the value group of ${}^cD$ lies in the value group of D and for the center of residue division algebra, $Z(\overline{{}^cD}) \subseteq \mathcal{N}(Z(\overline{D}) / \overline{F})^{1/k}$, where $\mathcal{N}(Z(\overline{D}) / \overline{F})$ is the normal closure of $Z(\overline{D})$ over $\overline{F}$ and k is an integer depending on which roots of unity lie in F and L.

Introduction.

For any finite separable extension L/F of fields and any central simple algebra A over L, the corestriction of A is a central simple F-algebra obtained as the fixed point algebra under a Galois group action (cf. [**Ri**]). This induces the map from the Brauer group Br (L) to Br (F) corresponding to the homological corestriction. Though this algebraic corestriction is an important tool in the theory of division algebras, it is actually very hard to work with. To gain a better insight into the behavior of the corestriction, we analyze here the corestriction for valued division algebras over Henselian valued fields, for which there is a well-developed structure theory. We will here concentrate on the case when L is inertial (unramified) over F. In a subsequent paper [**H2**], we will consider the more general case when L is tame over F, i.e. char $(\overline{F}) \nmid [L\colon F]$, where $\overline{F}$ is the residue field of the valuation on F.

For any ring R we write $Z(R)$ and R^* for the center of R and the group of units of R, respectively. We will consider only central simple algebras A *finite-dimensional* over a field F. By Wedderburn's theorem, $A \cong M_n(D)$, a matrix ring over a division algebra D, which is called the *underlying division algebra* of A.

A valued field (F, v) is called *Henselian* if v extends uniquely to each field algebraic over F. For a nice account for several other characterizations of Henselian valuations, see Ribenboim's paper [**Rb**]. Recall (e.g. from [**W1**]) that if D is a central division algebra over a Henselian valued field (F, v), there exists one and only one valuation on D extending v on F.