DISCRIMINANTS OF INVOLUTIONS ON HENSELIAN DIVISION ALGEBRAS

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The discriminant of an involution of the first kind on a finite-dimensional division algebra over a field with a Henselian valuation of residue characteristic different from 2 is computed in terms of residue information. We also describe the set of discriminants of involutions on such division algebras. In the case where the residue involution is the identity, a stable decomposition of the division algebra into the tensor product of a semi-ramified and a totally ramified subalgebra is obtained.

Knus, Parimala and Sridharan have recently defined the discriminant of an involution of the first kind on a central simple algebra [10] (see also [11]), and they have shown how the discriminant can be used to determine whether an involution on a central simple algebra of degree 4 is decomposable, i.e. whether the central simple algebra decomposes into a tensor product of two quaternion algebras stable under the involution. Although the discriminant of an involution is in principle easy to calculate (the definition is recalled in section 2.), it may prove difficult to determine explicitly for a given central simple algebra. Our purpose in this paper is to show how the discriminant can be computed explicitly for involutions on division algebras over Henselian fields of residual characteristic different from 2, in terms of residue information.

Our results depend on the kind of the residue involution and on whether the division algebra is inertially split or not; they are collected in Theorem 4. In particular, they show that every involution on a division algebra of degree at least 4 which is not inertially split has discriminant 1. As an application of the main Theorem, we also compute the discriminant of the involution considered by Amitsur,

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