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On Neggers' numbers of discrete valuation rings

By

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The purpose of this note is to show the converse of Theorem 3 in [3], that is,

Theorem. *Let R be a complete discrete valuation ring of unequal characteristic with a prime element u and with a coefficient ring P. Let K and K^* be quotient fields of R and P, respectively. If the Neggers' number $\Delta_{K/K^*}(u)<1$, there exists a coefficient ring $\bar{P}$ of R such that $\Omega_{R/\bar{P}}$ is not isomorphic to $\Omega_{R/P}$.*

In this paper we use the same notations and terminology as in [3]. Then, together with results in [1] and [3], we obtain various characterizations of the property that $\Delta_{K/K^*}(u)\geqq 1$:

Corollary. *The following conditions are equivalent.*

(1) $\Delta_{K/K^*}(u)\geqq 1$ *for a choice of P and u.*

(2) $\Delta_{K/K^*}(u)\geqq 1$ *for every choice of P and u.*

(3) *Every derivation in* Der(R, R) *induces a derivation in* Der$(R/m, R/m)$.

(4) *Every derivation in* Der $(R/m, R/m)$ *is induced by a derivation in* Der(R, R).

(5) $\Omega_{R/P}$ *is determined independently of the choice of P, up to*