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CORRECTION TO: "GALOIS THEORY OF DIFFERENTIAL FIELDS OF POSITIVE CHARACTERISTIC"

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ERRATA
CORRECTION TO GALOIS THEORY OF DIFFERENTIAL FIELDS OF POSITIVE CHARACTERISTIC

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The proof of Proposition 11 of this paper contains an error in the stage of proving that $C(\sigma)$ is finitely generated over C. We present here a correct proof.

Proof. Since σN is finitely generated over K and σ is strong, $N\sigma N = NC(\sigma)$ is finitely generated over N. Hence, there exist elements $\gamma_1, \dots, \gamma_s$ of $C(\sigma)$ such that $NC(\sigma) = N(\gamma_1, \dots, \gamma_s)$. For each element c of $C(\sigma)$, there exist polynomials F and G in $N[X_1, \dots, X_s]$ such that

$$F(\gamma_1, \dots, \gamma_s) - cG(\gamma_1, \dots, \gamma_s) = 0 \tag{1}$$

and $G(\gamma_1, \dots, \gamma_s) \neq 0$. Among the monomials of $\gamma_1, \dots, \gamma_s$ in the equation (1), we choose linearly independent elements $c_1, \dots, c_r$ over C and rewrite (1) in the form

$$\sum_{i=1}^{r} c_i a_i - c\left(\sum_{i=1}^{r} c_i b_i\right) = 0 \tag{2}$$

where $a_1, \dots, a_r, b_1, \dots, b_r \in N$ and $\sum_{i=1}^{r} c_i b_i \neq 0$. If $\{\alpha_1, \dots, \alpha_t\}$ is a maximal set of linearly independent elements over C in $\{a_1, \dots, a_r, b_1, \dots, b_r\}$, then a_i and b_i $(i = 1, \dots, r)$ are represented by

$$a_i = \sum_{j=1}^{t} a_{ij}\alpha_j \qquad (a_{i1}, \dots, a_{it} \in C)$$

and

$$b_i = \sum_{j=1}^{t} b_{ij}\alpha_j \qquad (b_{i1}, \dots, b_{it} \in C).$$

By (2), we have

$$\begin{aligned} 0 &= \sum_{i=1}^{r} c_i \left(\sum_{j=1}^{t} a_{ij}\alpha_j\right) - c\left(\sum_{i=1}^{r} c_i \left(\sum_{j=1}^{t} b_{ij}\alpha_j\right)\right) \\ &= \sum_{j=1}^{t} \left(\sum_{i=1}^{r} c_i a_{ij} - c\left(\sum_{i=1}^{r} c_i b_{ij}\right)\right)\alpha_j. \end{aligned}$$

Since N and $C(\sigma)$ are linearly disjoint over C, $\alpha_1, \ldots, \alpha_t$ are linearly independent over $C(\sigma)$ and thus

$$\sum_{i=1}^{r} c_i a_{ij} - c\left(\sum_{i=1}^{r} c_i b_{ij}\right) = 0 \qquad (j = 1, \ldots, t). \tag{3}$$

Suppose $\sum_{i=1}^{r} c_i b_{ij}$ $(j = 1, \ldots, r)$ are all equal to zero, then

$$b_{ij} = 0 \qquad (i = 1, \ldots, r,\ j = 1, \ldots, t)$$

since $c_1, \ldots, c_r$ are linearly independent over C. Thus,

$$\sum_{i=1}^{r} c_i b_i = \sum_{i=1}^{r} c_i \left(\sum_{j=1}^{t} b_{ij}\alpha_j\right) = 0,$$

and this contradicts $\sum_{i=1}^{r} c_i b_i \neq 0$. Therefore, there exists at least one index k such that $\sum_{i=1}^{r} c_i b_{ik} \neq 0$. Consequently, by (3),

$$c = \frac{\sum_{i=1}^{r} c_i a_{ij}}{\sum_{i=1}^{r} c_i b_{ij}} \in C(\gamma_1, \ldots, \gamma_s).$$

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