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ERRATUM

Erratum to: Differential Galois theory of linear difference equations

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Ruyong Feng pointed out that the proof of Proposition 2.9 contains a mistake and supplied a correct proof, which we present below.

In the second line of the proof, we say "*Therefore* $\partial(Z) - BZ = DZ$ *for some* $D \in \mathrm{gl}_n(k^\sigma)$". This is incorrect and the correct statement should be "*Therefore* $\partial(Z) - BZ = ZD$ *for some* $D \in \mathrm{gl}_n(k^\sigma)$". This change invalidates the argument in the first paragraph of that proof. The following is a replacement for the first paragraph of the proof. The remaining parts of the proof are correct.

Assume that such a B *exists. A calculation shows that* $\sigma(\partial(Z) - BZ) = A(\partial(Z) - BZ)$*. Therefore* $\partial(Z) - BZ = ZD$ *for some* $D \in \mathrm{gl}_n(k^\sigma)$*. Since* k^σ *is differentially closed, there is a* $U \in \mathrm{GL}_n(k^\sigma)$ *such that* $\partial(U) = -DU$*. We then have*

$$\partial(ZU) = \partial(Z)U + Z\partial(U) = (BZ + ZD)U - ZDU = B(ZU).$$

For any $\phi \in \mathrm{Aut}_{\sigma\partial}(R/k)$*, let* $[\phi]_Z \in \mathrm{GL}_n(k^\sigma)$ *denote the matrix such that* $\phi(Z) = Z[\phi]_Z$*. We then have*

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$$\partial(\phi(ZU)) = \partial\left((ZU)U^{-1}[\phi]_Z U\right) = \partial(ZU)U^{-1}[\phi]_Z U + ZU\partial\left(U^{-1}[\phi]_Z U\right)$$
$$= \phi(\partial(ZU)) = \phi(BZU) = BZUU^{-1}[\phi]_Z U,$$

which implies $ZU\partial(U^{-1}[\phi]_Z U) = 0$. *Therefore* $\partial(U^{-1}[\phi]_Z U) = 0$ *and so* $U^{-1}[\phi]_Z U \in \mathrm{GL}_n(C)$.

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