Erratum to "Ideals and Centralizing Mappings in Prime Rings"

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In the proof of the Theorem we want the automorphism $T$ to induce an automorphism on the ideal $U$, but this may not be the case, as pointed out by Hisao Tominaga (let $R$ be the polynomial ring over the integers in indeterminates $x_i$, $i = 0, \pm 1, \pm 2, \ldots$, and let $U$ be the ideal of $R$ generated by $x_1, x_2, \ldots$. If $T$ is defined by $T(x_i) = x_{i+1}$, then $T(U) \subseteq U$).

To handle this case, let

$$K = \cdots + T^{-2}(U) + T^{-1}(U) + U + T(U) + T^2(U) + \cdots.$$ 

$K$ is a nonzero ideal and $T$ induces an automorphism on $K$. Now we need to show that $[x, T(x)]$ is in the center $Z$ of $R$ for every $x$ in $K$. For $x$ in $K$,

$$x = T^{k(1)}(x_{k(1)}) + T^{k(2)}(x_{k(2)}) + \cdots + T^{k(n)}(x_{k(n)})$$

where each $x_{k(i)}$ is in $U$. Let

$$m = \text{absolute value} \left[ \min \{0, k(1), k(2), \ldots, k(n) \} \right].$$

Then $T^m(x) = y$ is in $U$ since $U$ is invariant under $T$. Hence $T^m[x, T(x)] = [T^m(x), T^{m+1}(x)] = [y, T(y)]$ is in $Z$ because $T$ is centralizing on $U$. Since $T$ is an automorphism, $[x, T(x)]$ is in $Z$ for every $x$ in $K$. Apply the result of Centralizing automorphisms of prime rings [Canad. Math. Bull. 19 (1976), 113–115] to $K$.

In the Corollary the same problem may occur and can be remedied in the automorphism case by a similar argument using the fact that the Jordan ideal is invariant under $T$. For derivations such that the associative ideal $I$ is not invariant, use $K = I + D(I) + D^2(I) + \cdots$, which is a nonzero ideal contained in $U$ and invariant under $D$.

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