

## GENERALIZED SKEW DERIVATIONS ON MULTILINEAR POLYNOMIALS IN RIGHT IDEALS OF PRIME RINGS

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Received 09:06:2011 : Accepted 18:12:2012

### Abstract

Let  $R$  be a prime ring,  $f(x_1, \dots, x_n)$  a multilinear polynomial over  $C$  in  $n$  noncommuting indeterminates,  $I$  a nonzero right ideal of  $R$ , and  $F : R \rightarrow R$  be a nonzero generalized skew derivation of  $R$ .

Suppose that  $F(f(r_1, \dots, r_n))f(r_1, \dots, r_n) \in C$ , for all  $r_1, \dots, r_n \in I$ . If  $f(x_1, \dots, x_n)$  is not central valued on  $R$ , then either  $\text{char}(R) = 2$  and  $R$  satisfies  $s_4$  or one of the following holds:

- (i)  $f(x_1, \dots, x_n)x_{n+1}$  is an identity for  $I$ ;
- (ii)  $F(I)I = (0)$ ;
- (iii)  $[f(x_1, \dots, x_n), x_{n+1}]x_{n+2}$  is an identity for  $I$ , there exist  $b, c, q \in Q$  with  $q$  an invertible element such that  $F(x) = bx - qxq^{-1}c$  for all  $x \in R$ , and  $q^{-1}cI \subseteq I$ . Moreover, in this case either  $(b - c)I = (0)$  or  $b - c \in C$  and  $f(x_1, \dots, x_n)^2$  is central valued on  $R$ .

**Keywords:** Identity, generalized skew derivation, automorphism, (semi-)prime ring.

*2000 AMS Classification:* 16W25, 16N60.

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