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Title: Characterization of additive maps ξ-Lie derivable at zero on von Neumann Algebras

Author(s): Xiaofei Qi, Jia Ji and Jinchuan Hou

Let $\mathcal{M}$ be any von Neumann algebra with the center $\mathcal{Z}(\mathcal{M})$. For any scalar ξ, denote by $[A,B]_\xi = AB - \xi BA$ the ξ-Lie product of $A, B \in \mathcal{M}$. Assume that $L : \mathcal{M} \to \mathcal{M}$ is an additive map. It is shown that, if $\mathcal{M}$ has no central summands of type I_1 or type I_2, then L satisfies $L([A,B]) = [L(A),B] + [A,L(B)]$ whenever $[A,B] = 0$ if and only if there exists an element $Z_0 \in \mathcal{Z}(\mathcal{M})$, an additive map $h : \mathcal{M} \to \mathcal{Z}(\mathcal{M})$ and an additive derivation $\varphi : \mathcal{M} \to \mathcal{M}$ such that $L(A) = \varphi(A) + h(A) + Z_0A$ for all $A \in \mathcal{M}$; if $\mathcal{M}$ has no central summands of type I_1, then L satisfies $L([A,B]_\xi) = [L(A),B]_\xi + [A,L(B)]_\xi$ whenever $[A,B]_\xi = 0$ with $\xi \neq 1$ if and only if $L(I) \in \mathcal{Z}(\mathcal{M})$ and there exists an additive derivation $\varphi : \mathcal{M} \to \mathcal{M}$ such that $\varphi(\xi A) = \xi\varphi(A)$ and $L(A) = \varphi(A) + L(I)A$ for all $A \in \mathcal{M}$. A result in [22] is improved for prime algebra case.

Address:
Xiaofei Qi
Department of Mathematics
Shanxi University
Taiyuan, 030006
P.R. China

Address:
Jia Ji
Department of Mathematics
Shanxi University
Taiyuan 030006
P.R. China

Address:
Jinchuan Hou
Department of Mathematics
Taiyuan University of Technology
Taiyuan 030024
P. R. China
and
Department of Mathematics
Shanxi University
Taiyuan 030006
P.R. China