Operators
and
Matrices
Volume 17, Number 1 (2023), 127–140
doi:10.7153/oam-2023-17-10

# MULTIPLICATIVE GENERALIZED LIE $n$–DERIVATIONS ON COMPLETELY DISTRIBUTIVE COMMUTATIVE SUBSPACE LATTICE ALGEBRAS

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*Abstract.* Let $Alg\mathcal{L}$ be a completely distributive commutative subspace lattice algebra and let $\delta : Alg\mathcal{L} \to Alg\mathcal{L}$ be a nonlinear map. It is shown that $\delta$ is a multiplicative generalized Lie $n$-derivation on $Alg\mathcal{L}$ with an associated multiplicative generalized Lie $n$-derivation $d$ if and only if $\delta(A) = \psi(A) + \xi(A)$ holds for every $A \in Alg\mathcal{L}$, where $\psi : Alg\mathcal{L} \to Alg\mathcal{L}$ is an additive generalized derivation and $\xi : Alg\mathcal{L} \to Z(Alg\mathcal{L})$ is a central-valued map vanishing on each $(n-1)$-th commutator $p_n(A_1, A_2, \cdots, A_n)$.

*Mathematics subject classification* (2020): 16W25, 47L35.
*Keywords and phrases*: Multiplicative generalized Lie $n$-derivations, multiplicative Lie $n$-derivations, completely distributive commutative subspace lattice algebras, strong convergence.

## REFERENCES

[1] I. Z. ABDULLAEV, *$n$-Lie derivations on von Neumann algebras*, Uzbek. Mat. Zh., 1992, 5–6: 3–9.
[2] D. BENKOVIČ, D. EREMITA, *Multiplicative Lie n-derivations of triangular rings*, Linear Algebra Appl., 2012, 436: 4223–4240.
[3] D. BENKOVIČ, *Generalized Lie $n$-derivations of triangular algebras*, Comm. Algebra, 2019, 47 (12): 5294–5302
[4] D. BENKOVIČ, *Jordan derivations and anti-derivations on triangular matrices*, Linear Algebra Appl., 2005, 397, 235–244.
[5] W. S. CHEUNG, *Lie derivation of triangular algebras*, Linear and Multilinear Algebra. 2003, 51: 299–310.
[6] X. FENG, X. F. QI, *Nonlinear Generalized Lie $n$-Derivations on von Neumann Algebras*, Bull. Iran. Math. Soc., 2019, 45 (2): 569–581.
[7] H. GHAHRAMANI, *Jordan derivations on trivial extensions*, Bull. Iranian Math. Soc., 2013, 9 (4): 635–645.
[8] F. GILFEATHER, R. L. MOORE, *Isomorphisms of certain CSL algebras*, J. Funct. Anal, 2010, 67 (2): 264–291.
[9] B. HVALA, *Generalized Lie derivations in prime rings*, Taiwanese J. Math., 2007, 11: 1425–1430.
[10] M. S. LAMBROU, *Complete distributivity lattices*, Fundamenta Math., 1983, 119 (3): 227–240.
[11] C. LAURIE, W. LONGSTAFF, *A note on rank-one operators in reflexive algebras*, Proc. Amer. Math. Soc., 1983, 89 (2): 293–297.
[12] W. H. LIN, *Nonlinear generalized Lie $n$-derivations on triangular algebras*, Commun. Algebra. 2018, 46 (6): 2368–2383.
[13] W. E. LONGSTAFF, *Operators of rank one in reflexive algebras*, Canadian Journal of Mathematics, 1976, 28: 9–23.
[14] F. Y. LU, *Derivations of CDC algebras*, J. Math. Anal. Appl., 2006, 323 (1): 179–189.
[15] F. Y. LU, *Lie derivations of certain CSL algebras*, Israel J. Math., 2006, 155 (1): 149–156.
[16] F. MA, G. X. JI, *Generalized Jordan derivation on trigular matrix algebra*, Linear and Multilinear Algebra, 2007, 55: 355–363.


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[17] F. MA, J. H. ZHANG, H. Z. LIU, *Nonlinear generalized Lie derivations on Completely Distributive Commutative Subspace Lattice Algebras*, J. Acta. Snus., 2022, doi:10.13471/j.cnki.acta.snus.2020A029.
[18] W. S. MARTINDALE III, *Lie derivations of primitive rings*, Michigan Math. J. 1964; 11: 183–187.
[19] Y. WANG, Y. WANG, *Multiplicative Lie $n$-derivations of generalized matrix algebras*, Linear Algebra Appl., 2013, 438: 2599–2616.
[20] W. Y. YU, J. H. ZHANG, *Nonlinear Lie derivations of triangular algebras*, Linear Algebra Appl., 2010, 432: 2953–2960.

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