

A CRITERION OF LOCAL DERIVATIONS ON THE SEVEN-DIMENSIONAL SIMPLE MALCEV ALGEBRA

F. ARZIKULOV AND I. A. KARIMJANOV

Abstract. In the present paper we give a matrix form of local derivations of the complex finite dimensional simple (non-Lie) Malcev algebra \mathbb{M} , and a direct proof of the statement that every 2-local derivation of \mathbb{M} is a derivation. We have some description of local and 2-local derivations of complex finite-dimensional semisimple binary Lie algebras.

Mathematics subject classification (2020): 16W25, 46L57, 47B47, 17C65.

Keywords and phrases: Jordan algebra, derivation, inner derivation, local inner derivation, Jordan algebra of matrices.

REFERENCES

- [1] SH. AYUPOV, F. ARZIKULOV, *2-Local derivations on semi-finite von Neumann algebras*, Glasgow Mathematical Journal, 56 (2014), 9–12.
- [2] SH. AYUPOV, F. ARZIKULOV, *2-Local derivations on associative and Jordan matrix rings over commutative rings*, Linear Algebra and its Applications, 522 (2017), 28–50.
- [3] SH. AYUPOV, F. ARZIKULOV, N. UMRZAQOV, O. NURIDDINOV, *Description of 2-local derivations and automorphisms on finite-dimensional Jordan algebras*, Linear and Multilinear Algebra (2020), doi:10.1080/03081087.2020.1845595.
- [4] SH. AYUPOV, A. ELDUQUE, K. KUDAYBERGENOV, *Local and 2-local derivations of Cayley algebras*, arXiv:2105.08423 math.RA.
- [5] SH. AYUPOV, K. KUDAYBERGENOV, *2-Local derivations and automorphisms on $B(H)$* , Journal of Mathematical Analysis and Applications, 395 (2012), 15–18.
- [6] SH. AYUPOV, K. KUDAYBERGENOV, *2-Local derivations on von Neumann algebras*, Positivity, 19 (2015), 445–455.
- [7] SH. AYUPOV, K. KUDAYBERGENOV, *2-Local automorphisms on finite-dimensional Lie algebras*, Linear Algebra and its Applications, 507 (2016), 121–131.
- [8] SH. AYUPOV, K. KUDAYBERGENOV, *Local derivations on finite-dimensional Lie algebras*, Linear Algebra and its Applications, 493 (2016), 381–398.
- [9] SH. AYUPOV, K. KUDAYBERGENOV, B. OMIROV, *Local and 2-local derivations and automorphisms on simple Leibniz algebras*, Bulletin of the Malaysian Mathematical Sciences Society, 43 (2020), 3, 2199–2234.
- [10] SH. AYUPOV, K. KUDAYBERGENOV, I. RAKHIMOV, *2-Local derivations on finite-dimensional Lie algebras*, Linear Algebra and its Applications, 474 (2015) 1–11.
- [11] M. COSTANTINI, *Local automorphisms of finite dimensional simple Lie algebras*, Linear Algebra and its Applications, 562 (2019), 123–134.
- [12] A. GRISHKOV, *Structure and representations of binary-Lie algebras*, Izvestiya: Mathematics, 44 (1980), 5, 999–1030.
- [13] V. FILIPPOV, *On δ -derivations of prime alternative and Malcev algebras*, Algebra and Logic, 39 (2000), 5, 354–358.
- [14] R. KADISON, *Local derivations*, Journal of Algebra, 130 (1990), 2, 494–509.
- [15] I. KAYGORODOV, *On $(n+1)$ -ary derivations of simple n -ary Malcev algebras*, St. Petersburg Mathematical Journal, 25 (2014), 4, 575–585.

- [16] I. KAYGORODOV, YU. POPOV, *A characterization of nilpotent nonassociative algebras by invertible Leibniz-derivations*, Journal of Algebra, 456 (2016), 323–347.
- [17] M. KHRYPCHENKO, *Local derivations of finitary incidence algebras*, Acta Mathematica Hungarica, 154 (2018), 1, 48–55.
- [18] S. KIM, J. KIM, *Local automorphisms and derivations on M_n* , Proceedings of the American Mathematical Society, 132 (2004), 1389–1392.
- [19] E. KUZMIN, *Structure and representations of finite dimensional Malcev algebras*, Quasigroups and Related Systems, 22 (2014) 97–132.
- [20] Y. LIN, T. WONG, *A note on 2-local maps*, Proceedings of the Edinburgh Mathematical Society, 49 (2006), 701–708.
- [21] A. MAL'CEV, *Analytic loops*, Matematicheskii Sbornik (in Russian), 36 (78) (1955), 569–576.
- [22] P. ŠEMRL, *Local automorphisms and derivations on $B(H)$* , Proceedings of the American Mathematical Society, 125 (1997), 2677–2680.