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On a class of finitary Lie algebras characterized through derivations

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MSC Classification: 17B40 17B65 16W10

Keywords: Derivation, finite rank, nonassociative algebra, simple Lie algebra, finitary Lie algebra, inner ideal.

Review text:

Recall that a Lie algebra L over a field \mathbb{F} is said to be finitary if it is isomorphic to a subalgebra of the Lie algebra $\text{fgl}(X)$ of all finite rank operators on a vector space X over \mathbb{F} . The classification of the infinite dimensional finitary simple Lie algebras over a field of characteristic 0 was given by A.A. Baranov, [finitary simple Lie algebras, J. Algebra 219 (1999) 299–329]. In [Journal of Algebra, 319 (2008), 2372–2394] A. Fernández, E. García and M. Gómez proved that a simple Lie algebra L over a field \mathbb{F} of characteristic 0 is finitary if and only if it contains a finite dimension abelian inner ideal.

In the paper under review the authors prove that every derivation of an infinite-dimensional simple Lie algebra L over a field of characteristic 0 has infinite rank. Moreover, they prove that if an infinite-dimensional simple Lie algebra L over a field of characteristic 0 contains a derivation d , where d^n is nonzero and has finite rank ($n \geq 2$) then L contains a finite-dimensional abelian inner ideal, and therefore it is finitary.

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