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The cohomology of filiform Lie algebras of maximal rank [☆]



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ABSTRACT

We describe the structure of the cohomology of the filiform Lie algebras L_n and Q_n as a module over their (2-dimensional) torus of derivations. Our approach relies on the fact that both filiform algebras have an ideal \mathfrak{h} of codimension 1 for which the structure of its cohomology under the action of the Levi factor of the algebra of derivations of \mathfrak{h} is known.

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1. Introduction

A filiform Lie algebra is a nilpotent Lie algebra of maximal class. The rank of a filiform Lie algebra¹ is at most 2 and there are, up to isomorphism, only two families of filiform Lie algebras of rank 2 [7]:

$$\{L_n : n \geq 2\} \quad \text{and} \quad \{Q_n : n \geq 3, n \text{ odd}\}.$$

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¹ The rank of a nilpotent Lie algebra is the dimension of a maximal torus of derivations.