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Helena Albuquerque, Elisabete Barreiro, Antonio J. Calderón Martín, José M. Sánchez Delgado

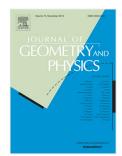
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### **ACCEPTED MANUSCRIPT**

#### THE STRUCTURE OF LEIBNIZ SUPERALGEBRAS ADMITTING A MULTIPLICATIVE BASIS

HELENA ALBUQUERQUE, ELISABETE BARREIRO, ANTONIO J. CALDERÓN MARTÍN, AND JOSÉ M. SÁNCHEZ DELGADO

ABSTRACT. In the literature, most of the descriptions of different classes of Leibniz superalgebras  $(\mathfrak{L} = \mathfrak{L}_{\overline{0}} \oplus \mathfrak{L}_{\overline{1}}, [\cdot, \cdot])$  have been made by given the multiplication table on the elements of a graded basis  $\mathcal{B} = \{v_k\}_{k \in K}$  of  $\mathfrak{L}$ , in such a way that for any  $i, j \in K$  we have  $[v_i, v_j] = \lambda_{i,j}[v_j, v_i] \in \mathbb{F}v_k$  for some  $k \in K$ , where  $\mathbb{F}$  denotes the base field and  $\lambda_{i,j} \in \mathbb{F}$ . In order to give a unifying viewpoint of all these classes of algebras we introduce the category of Leibniz superalgebras admitting a multiplicative basis and study its structure. We show that if a Leibniz superalgebra  $\mathfrak{L} = \mathfrak{L}_{\overline{0}} \oplus \mathfrak{L}_{\overline{1}}$  admits a multiplicative basis then it is the direct sum  $\mathfrak{L} = \bigoplus_{\alpha} \mathcal{I}_{\alpha}$  with any  $\mathcal{I}_{\alpha} = \mathcal{I}_{\alpha,\overline{0}} \oplus \mathcal{I}_{\alpha,\overline{1}}$  a well described ideal of  $\mathfrak{L}$  admitting a multiplicative basis inherited from  $\mathcal{B}$ . Also the  $\mathcal{B}$ -simplicity of  $\mathfrak{L}$  is characterized in terms of J-connections.

*Keywords*: Leibniz superalgebra, multiplicative basis, infinite dimension, structure theory.

MSC2010: 17A32, 17A70, 17A60.

#### 1. INTRODUCTION AND PREVIOUS DEFINITIONS

Leibniz superalgebras appear as an extension of Leibniz algebras (see [4, 5, 10, 13, 14, 15, 16, 17]), in a similar way than Lie superalgebras generalize Lie algebras, motivated in part for its applications in Physics. The present paper is devoted to the study of the structure of Leibniz superalgebras  $\mathfrak{L}$  admitting a multiplicative basis over a field  $\mathbb{F}$ . Since a Leibniz algebra is a particular case of a Leibniz superalgebra (with  $\mathfrak{L}_{\overline{1}} = \{0\}$ ), this work extends the results exhibited in [6]. We would like to remark that the techniques used in this paper also hold in the infinite-dimensional case over arbitrary fields, being adequate enough to provide us a second Wedderburn-type theorem in this general framework (Theorems 2.1 and 3.1). Moreover, although we make use of the ideal  $\mathfrak{I}$  which is deeply inherent to Leibniz theory, we believe that our approach can be useful for the knowledge of the structure of wider classes of algebras.

**Definition 1.1.** A Leibniz superalgebra  $\mathfrak{L}$  is a  $\mathbb{Z}_2$ -graded algebra  $\mathfrak{L} = \mathfrak{L}_{\overline{0}} \oplus \mathfrak{L}_{\overline{1}}$  over an arbitrary base field  $\mathbb{F}$ , with its bilinear product denoted by  $[\cdot, \cdot]$ , whose homogenous elements  $x \in \mathfrak{L}_{\overline{i}}, y \in \mathfrak{L}_{\overline{j}}, \overline{i}, \overline{j} \in \mathbb{Z}_2$ , satisfy

$$[x,y] \in \mathfrak{L}_{\overline{i}+\overline{j}}$$

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