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Title: Lie-central derivations, Lie-centroids and Lie-stem Leibniz algebras

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In this paper, we introduce the notion of a Lie-derivation. This concept generalizes derivations for non-Lie Leibniz algebras. We study these Lie-derivations in the case where their image is contained in the Lie-center, and call them Lie-central derivations. We provide a characterization of Lie-stem Leibniz algebras by their Lie-central derivations, and prove several properties of the Lie algebra of Lie-central derivations for Lie-nilpotent Leibniz algebras of class 2. We also introduce  $ID_*$ -Lie-derivations. An  $ID_*$ -Lie-derivation of a Leibniz algebra  $\mathfrak g$  is a Lie-derivation of  $\mathfrak g$  in which the image is contained in the second term of the lower Lie-central series of  $\mathfrak g$ , and which vanishes on Lie-central elements. We provide an upper bound for the dimension of the Lie algebra  $ID_*^{Lie}(\mathfrak g)$  of  $ID_*$ -Lie-derivation of  $\mathfrak g$ , and prove that the sets  $ID_*^{Lie}(\mathfrak g)$  and  $ID_*^{Lie}(\mathfrak q)$  are isomorphic for any two Lie-isoclinic Leibniz algebras  $\mathfrak g$  and  $\mathfrak q$ .

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