

Some applications of the non-abelian tensor product of Hom-Leibniz algebras

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Hom-Leibniz algebras were introduced in [3] as triples $(L, [-, -], \alpha_L)$ consisting of a vector space L , a bilinear map $[-, -] : L \times L \rightarrow L$, and a linear map $\alpha_L : L \rightarrow L$ satisfying:

$$[\alpha_L(x), [y, z]] = [[x, y], \alpha_L(z)] - [[x, z], \alpha_L(y)]$$

for all $x, y, z \in L$.

In this note we introduce a non-abelian Hom-Leibniz tensor product, extending the non-abelian Leibniz tensor product by Gnedbaye [2], and we analyze its properties.

We give applications to universal (α) -central extensions of Hom-Leibniz algebras and Hochschild homology of Hom-associative algebras.

In concrete, we construct the universal (α) -central extension, introduced in [1], of an (α) -perfect Hom-Leibniz algebra by means of the non-abelian Hom-Leibniz tensor product

Further, Hom-type version of Gnedbaye's result relating Hochschild and Milnor type Hochschild homology of associative algebras [2], doesn't hold for all Hom-associative algebras and requires an additional condition.

References

- [1] J. M. CASAS, M. A. INSUA, N. PACHECO REGO, On universal central extensions of Hom-Leibniz algebras, *J. Algebra Appl.* **13** (8) (2014), 1450053 (22 pp.).
- [2] A. V. GNEDBAYE, A non-abelian tensor product of Leibniz algebras, *Ann. Inst. Fourier, Grenoble* **49** (4) (1999), 1149–1177.
- [3] A. MAKHLOUF, S. SILVESTROV, Hom-algebra structures, *J. Gen. Lie Theory Appl.* **2** (2) (2008), 51–64.

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