

ALGEBRAIC AND LOGICAL TOPICS THAT NEED TO BE INVESTIGATED

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ABSTRACT. The aim of this article is to introduce 11 topics, including improving formalisms and some algebraic structures, that should be investigated. These topics are not merely open problems; rather, they are the seeds of new research fields. Some of them investigate the influence of formalisms on mathematical results and their potential applications in the foundations of categorical algebra and the algebraic structure of intelligent systems.

Additionally, quotes from renowned mathematicians such as Gottfried Leibniz (1646-1716), André-Marie Ampère (1775-1836), David Hilbert (1862-1943), Stefan Banach (1892-1945), John von Neumann (1903-1957), and David van Dantzig (1900-1959) are cited to underscore the importance of these research topics.

REFERENCES

- [1] Jiří Adámek, Horst Herrlich and George E. Strecker: *Abstract and Concrete Categories: The Joy of Cats*, Reprint of the original [Wiley, New York, 1990 (PAM 6)], 2006.
- [2] Douglas Cenzer *et al.*: *Set Theory And Foundations Of Mathematics: An Introduction To Mathematical Logic-Volume II: Foundations Of Mathematics*, World Scientific, 2022.
- [3] E.A. Coddington and N. Levinson. *Theory of Ordinary Differential Equations*, McGraw-Hill Book Co., Inc., New York-Toronto-London, 1955.
- [4] Thomas Eiter, Thomas Lukasiewicz and Michael Walter: Extension of the relational algebra to probabilistic complex values, in *Foundations of Information and Knowledge Systems* (Klaus-Dieter Schewe and Bernhard Thalheim (Eds)), Springer, 2000 (LNCS 1762), pp. 94-115.
- [5] K. Göde: Literatureberichte: *Verzeichnis von Büchern, die bei der Redaktion eingelaufen sind und einer späteren Besprechung vorbehalten bleiben*, Monatsh. f. Mathematik und Physik, **38**(1931), A61-A62.
- [6] J.G. Henriksen, J. Jensen, M. Jørgensen, N. Klarlund, R. Paige, T. Rauhe and A. Sandholm: Monadic second-order logic in practice, in *Tools and Algorithms for the Construction and Analysis of Systems* (E. Brinksma, W.R. Cleaveland, K.G. Larsen, T. Margaria and B. Steffen (Eds)), Springer, 1995 (LNCS 1019), pp. 89-110.
- [7] Albert Messiah: *Quantenmechanik. Band 2*, Third. Translated from the French and with a foreword by Joachim Streubel, Walter de Gruyter & Co., Berlin, 1990.
- [8] Juan-Esteban Palomar Tarancón: *Co-universal algebraic extension with hidden parameters*, Theory Appl. Math. Comput. Sci., **6**(2016), No. 2, 150-169.
- [9] Juan-Esteban Palomar Tarancón: *Algebraic categories with blurred objects*, J. Adv. Math. Stud., **17**(2024), No. 1, 10-33.
- [10] Juan-Esteban Palomar Tarancón: *Introducing new paradigms for algebraic and intelligent-system research*, J. Adv. Math. Stud., **17**(2024), No. 3, 330-361.
- [11] Flash Sheridan: *A closer look at the Russell paradox*, Log. Anal. (N.S.), **66**(2023), No. 262, 125-146.

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- [12] A.A. Zenkin: *Logic of actual infinity and G. Cantor's diagonal proof of the uncountability of the continuum*, Review Modern Logic, **9**(2003/04), No. 3-4, 27-82.

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