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On free modes

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Abstract: We prove a theorem describing the equational theory of all modes of a fixed type. We use this result to show that a free mode with at least one basic operation of arity at least three, over a set of cardinality at least two, does not satisfy identities selected by Á. Szendrei in Identities satisfied by convex linear forms, Algebra Universalis 12 (1981), 103–122, that hold in any subreduct of a semimodule over a commutative semiring. This gives a negative answer to the question raised by A. Romanowska: Is it true that each mode is a subreduct of some semimodule over a commutative semiring?

Keywords: modes, Szendrei modes, subreducts, semimodules, equational theory
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