Mallol, Cristián; **Nourigat, Michelle**; **Varro, Richard**

On the train algebras of degree four: structures and classifications. (Sur les train algèbres de degré quatre: structures et classifications.) (English) Zbl 1193.17017

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The paper deals with train algebras of degree 4. A baric algebra (A, ω) is a train algebra of degree 4 if its elements satisfy an identity of the form

$$x^4 = \sum_{k=1}^{3} \alpha_k \omega(x)^{3-k} x^k.$$

The study of train algebras of degree 4 can be reduced, as proved in *C. Mallol* and *R. Varro* [J. Algebra 261, 1–18 (1985; Zbl 1134.17312)], to the study of those whose polynomial identity is of the form

$$x^4 = \varepsilon x^3 + \delta x^2 + (1 - \varepsilon - \delta)x$$

with $\varepsilon \in \{0, 2\}$.

The paper is mainly concerned with train algebras of degree 4 such that $\varepsilon \in \{0, 2\}$ and $\delta \neq -\frac{5}{4}, \frac{3}{4}, \frac{7}{4}$ (Type 1) and such that $\varepsilon = 0$ and $\delta = \frac{3}{4}$ (Type 2). The main interest of these two types is that they have idempotents and, consequently, we have the Peirce decomposition. The existence of this decomposition leads to structure theorems for these two types of algebras and also, for algebras of dimension ≤ 4, to a complete classification up to isomorphism.

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Peirce decomposition; plenary train algebras; principal train algebras

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