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ON INDEPENDENTLY PARTITIONABLE SETS OF SEMIGROUP IDENTITIES

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A set Σ of first-order sentences is said to be independently partitionable if there exists a partition $\Sigma = \bigcup_{n\in\mathbb{N}} \Sigma_n$ such that $\operatorname{var}\Sigma \neq \operatorname{var}\Sigma \setminus \Sigma_{\mathrm{n}}$ for every $n \in \mathbb{N}$. A set Σ of first-order sentences is said to be finitely independently partitionable if there exists a partition $\Sigma = \bigcup_{n\in\mathbb{N}} \Sigma_n$ such that Σ_n is finite and $\operatorname{var}\Sigma \neq \operatorname{var}\Sigma \setminus \Sigma_{\mathrm{n}}$ for every $n \in \mathbb{N}$.

We construct some varieties $\mathfrak{X}$, $\mathfrak{Y}$, and $\mathfrak{Z}$ of semigroups such that $\mathfrak{X}$ has no independently partitionable basis for identities, $\mathfrak{Y}$ has an independently partitionable basis but has no finitely independently partitionable basis for identities, and $\mathfrak{Z}$ has a finitely independently partitionable basis but has no independent basis for identities. We also present varieties $\mathfrak{X}$ and $\mathfrak{Y}$ of semigroups such that $\mathfrak{X} \subset \mathfrak{Y}$, $\mathfrak{X}$ and $\mathfrak{Y}$ possess independent bases for their identities, and $\mathfrak{X}$ has an independently partitionable basis but has no finitely independently partitionable basis for its identities in $\mathfrak{Y}$; moreover, none of subvarieties of $\mathfrak{Y}$ covers $\mathfrak{X}$.

Key words and phrases: variety of semigroups, identity, independent basis.

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