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Abstracts

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Congruences on the product of two full transformation monoids

In 1952, Malcev described the congruences of the monoid $\mathcal{T}_n$ of all full transformations on a finite set $X_n = \{1, \ldots, n\}$. Since then, congruences have been characterized in various other monoids of (partial) transformations on X_n, such as the symmetric inverse monoid $\mathcal{I}_n$ of all injective partial transformations, or the monoid $\mathcal{PT}_n$ of all partial transformations.

Although these results are about 60 years old, none of them have previously been generalized to products of two such monoids. Our work closes this gap by describing all congruences of $\mathcal{T}_m \times \mathcal{T}_n$. As it turns out, the congruence structure of the factors is still visible in the congruences of the product, but the variations introduced by having an extra component adds a high level of technical complexity which accounts for the difficulty in achieving this result.

In addition to presenting the congruences of $\mathcal{T}_m \times \mathcal{T}_n$, we will also address generalizations to products of $\mathcal{PT}_n$, $\mathcal{I}_n$, and matrix monoids, as well as generalizations to products with more than 2 factors.

This is a joint work with João Araújo and Gracinda M.S. Gomes (CEMAT, University of Lisbon).