On the Relative Rank of Transformation Semigoups With Restricted Range

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Abstract : In 1998, J.M. Howie, N. Ruškuc, and P.M. Higgins have introduced
the concept of the relative rank of a semigroup S modulo a given set $U \subseteq S$ as the
minimum size of a subset $G \subseteq S$ such that $\langle G \cup U \rangle = S$ (denoted by rank$(S : U)$).
In this talk, we consider the semigroup $T(X,Y)$ of all full transformations on a
given set X into a fixed subset $Y \subseteq X$. This semigroup is called transformation
semigroup with restricted range which has been first introduced by J.S.V. Symons
in 1975.

The aim of the talk is to determine the relative rank of $T(X,Y)$ modulo several
subsets and subsemigroups, respectively, of $T(X,Y)$, for example, modulo the
semigroup $O(X,Y)$ of all order-preserving transformations in $T(X,Y)$, modulo
the semigroup $OP(X,Y)$ of all orientation-preserving transformations in $T(X,Y)$
etc. In particular, we give the characterization of the minimum generating sets of
several semigroups modulo various sets.

Keywords : relative rank, transformation semigroups, order-preserving transformations, orientation-preserving transformations

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