

Permutation-like groups of matrices

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We introduce the permutation-like groups, i.e., the finite groups \mathcal{G} of complex matrices, such that every matrix $X \in \mathcal{G}$ is similar to a permutation matrix. We investigate the following question: When a permutation-like group is equivalent (simultaneously similar) to a group of permutation matrices? Various examples show that in general a permutation-like group does not have to be equivalent to a group of permutation matrices. In fact there are counterexamples for every $n \geq 6$. We give complete answers for low-dimensional cases $n = 2, 3, 4, 5$.