STABILITY AND TESTABILITY OF PERMUTATIONS' EQUATIONS.

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Abstract:

We study a new direction of research in "property testing": Permutation equations. Let A and B be two permutations in $Sym(n)$ that "almost commute"- are they a small deformation of permutations that truly commute? More generally, if R is a system of word-equations in variables $X = x_1, \cdots, x_d$ and $A_1, \cdots, A_d$ are permutations that are almost a solution; are they near a true solution? It turns out that the answer to this question depends only on the group presented by the generators X and relations R. This leads to the notions of "stable groups" and "testable groups" and calls for some group theoretic methods for answering these questions. We will present a few results and methods which were developed in recent years to check whether a group is stable testable (e.g., using $IRS's =$ invariant random subgroups). We will also describe the connection of this subject with locally testable codes as well as with the long-standing problem of whether every group is sofic.