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Subpolygroup Commutativity Degrees of Finite Polygroups

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Abstract: Cayley's theorem states that every group G is isomorphic to a subgroup of the symmetric group acting on G. A hypergroup represents a natural generalization of a group and it was introduced by Marty in 1934. A special class of hypergroups, known as polygroups (or quasi-canonical hypergroups), was introduced and studied by Comer in 1984. There are many ways to construct polygroups. One of these ways is the polygroup associated to a group G. On the other hand the commutativity degree in groups have been of great importance for many algebraists and many related work was done. In this paper and inspired by the work related to subgroup commutativity degree of a finite group, we introduce the concept of subpolygroup commutativity degree sd(P) of a finite polygroup P. This quantity measures the probability of two random subpolygroups of P commuting. By finding a relation between the lattice of a group and the lattice of its associated polygroup, we find explicit formulas for the subpolygroup commutativity degree of polygroups associated to finite groups such as the dihedral group, quasi- dihedral group, and generalized quaternion group.

Keywords: polygroup; subpolygroup; subpolygroup lattice; supolygroup commutativity degree

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