



Mathematics > Combinatorics

# Actions and identities on set partitions

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A labeled set partition is a partition of a set of integers whose arcs are labeled by nonzero elements of an abelian group  $A$ . Inspired by the action of the linear characters of the unitriangular group on its supercharacters, we define a group action of  $A^n$  on the set of  $A$ -labeled partitions of an  $(n+1)$ -set. By investigating the orbit decomposition of various families of set partitions under this action, we derive new combinatorial proofs of Coker's identity for the Narayana polynomial and its type B analogue, and establish a number of other related identities. In return, we also prove some enumerative results concerning André and Netto's supercharacter theories of type B and D.

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