Eigenvalues of the difference matrices of the Lee partition

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Abstract

The eigenvalues of the difference matrices of the classes of the Sharma-Kaushik partition of F_q called the Lee partition are investigated, where q is a positive integer greater than one. With the use of the theory of circulant matrices, the eigenvalues are obtained. It is established that for q prime, all the difference matrices apart from the first one have the same set of eigenvalues and that certain permutations of the eigentuple of one difference matrix produces the eigentuples of the other difference matrices. The set of such permutations are shown to form a group with respect to the operation composition of permutations.

Keywords and phrases : *Eigenvalues, difference matrices, lee partition.*

1. Introduction

Partitions of a set have been much studied. Gian-Carlo Rota [5] considered the number of partitions of a set. Ichero Semba [6] described an algorithm generating all partitions of the set $\{1, 2, \ldots, n\}$. Munagi [4] presented a connection between integer partitions and set partitions and obtained an enumeration of partitions of arbitrary subsets of $\{1, 2, \ldots, n\}$. Mansour and Severini [3] found an explicit formula for the ordinary generating function of the number of (k, d)-noncrossing partitions of $\{1, 2, \ldots, n\}$. Sharma and Kaushik [7] took the study of partitions of sets of integers in a new direction when they introduced and studied partitions of the field of integers modulo q, in terms of which metrics can be defined.

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