**Mathematics > Combinatorics**

# Multivariate Rogers-Szegö polynomials and flags in finite vector spaces

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We give a recursion for the multivariate Rogers-Szeg\"o polynomials, along with another recursive functional equation, and apply them to compute special values. We also consider the sum of all $q$-multinomial coefficients of some fixed degree and length, and give a recursion for this sum which follows from the recursion of the multivariate Rogers-Szeg\"o polynomials, and generalizes the recursion for the Galois numbers. The sum of all $q$-multinomial coefficients of degree $n$ and length $m$ is the number of flags of length $m-1$ of subspaces of an $n$-dimensional vector space over a field with $q$ elements. We give a combinatorial proof of the recursion for this sum of $q$-multinomial coefficients in terms of finite vector spaces.

## Submission history

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