

Multivariate Rogers-Szegö polynomials and flags in finite vector spaces

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(Submitted on 3 Nov 2010)

We give a recursion for the multivariate Rogers-Szegö 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-Szegö 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.

Subjects: **Combinatorics (math.CO)**

MSC classes: 05A19, 05A15, 05A30

Cite as: **arXiv:1011.0984v1 [math.CO]**

Submission history

From: C. Ryan Vinroot [view email]

[v1] Wed, 3 Nov 2010 19:34:34 GMT (10kb)

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