MATRIX REPRESENTATION OF THE SUM OF THE WEIGHTED EQUAL POWERS WITH NATURAL BASE NUMBERS

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In this paper we consider the matrix representation of the combinatorial expression of a finite sum, which includs the weighted powers of natural numbers with the same parameters, and reveal the properties of the recived representation by matrices, connected with invariancy of its components concerning the base numbers and parameters. In this case, combinatorial expression of this amount involves the use of it is the binomial coefficients (along with the given weights).

The initial expression of the transformed finite sum has the form

$$\Phi(p,\nu) = \sum_{\pi=1}^{\rho} b_\pi \pi^\nu \ ; \ \rho,\nu,\pi \in N \ ; b_\pi \in R \ ;$$

here b_π - given a weighting factor.

Matrix interpretation of a result of combinatorial transform $\Phi(p,\nu)$ [1], performed with the assistance of the necessary studies, allowed to represent the result as a product of matrix components M_α, M_ϕ. The first of these, containing only the binomial coefficients, and $\nu \leqslant \rho$ was independent on the values of ρ, and the second containing the specified weights for $\rho \leqslant \nu$ was independent on the values of ν.

Thus, for the case $\nu \leqslant \rho$ or $\rho \leqslant \nu$ when its need of calculating a finite number of weighted sums of equal powers with different values, respectively ρ and ν calculation of the elements of the matrix M_α or M_ϕ is sufficient to make only once. In addition, the presence of certain matrixes M_α, M_ϕ and the initial values $\rho = \rho_u, \nu = \nu_u$ allows to receive rather simply a gang of necessary matrix components from available elementary values for quantitative determination of any sum $\Phi(\rho \leqslant \rho_u, \nu \leqslant \nu_u)$. It's significantly reduces the amount of the relevant calculations.