1053-05-20 **Vyacheslav Pavlovich Krivokolesko*** (antonk@ktk.ru), Krasnoyarsk, 660021, Russia. *An integral representation for linearly convex polyhedra and several combinatorial identities.* Preliminary report.

Using an integral representation from [1] for functions that are holomorphic in a linearly convex polyhedron with a piecewise smooth boundary

$$G = \{z = (z_1, z_2) \in \mathbb{C}^2 : g^1(|z|) = -|z_1| + a < 0, g^2(|z|) = -|z_2| + b < 0,$$

$$g^3(|z|) = |z_1|^2 + |z_2|^2 - r^2 < 0, r > a, r > b\}. \tag{1}$$

we obtain some combinatorial identities.

Theorem. *For* $0 < \alpha < 1$, $0 < \beta < 1$ *the following identities hold:*

$$\frac{(s_1+s_2+1)!}{s_1!s_2!}\sum_{m=0}^{s_1}\frac{(-1)^m}{s_2+m+1}\binom{s_1}{m}\left((1-\alpha)^{s_2+m+1}-\beta^{s_2+m+1}\right)$$

$$\equiv (1-\alpha)^{s_2+1}\sum_{m=0}^{s_1}\binom{s_2+m}{m}\alpha^m - \beta^{s_2+1}\sum_{m=0}^{s_1}\binom{s_2+m}{m}(1-\beta)^m, \tag{2}$$

$$1 \equiv \frac{(s_1+s_2+1)!}{s_1!s_2!}\sum_{m=0}^{s_1}\frac{(-1)^m}{s_2+m+1}\binom{s_1}{m}\left((1-\alpha)^{s_2+m+1}-\beta^{s_2+m+1}\right) +$$

$$\alpha^{s_1+1}\sum_{m=0}^{s_2}\binom{s_1+m}{m}(1-\alpha)^m + \beta^{s_2+1}\sum_{m=0}^{s_1}\binom{s_2+m}{m}(1-\beta)^m. \tag{3}$$

Corollary. *For $m = 0, \dots s_1$ the following identities are valied:*

$$\binom{s_2+m}{s_2} = (-1)^m \frac{(s_1+s_2+1)!}{s_1!s_2!} \sum_{k=m}^{s_1} \frac{(-1)^k}{s_2+k+1} \binom{s_1}{k} \binom{k}{m} \tag{4}$$

In the spesial case $m = 0$ we recover the formula No.45 on page 611 in [2].

Bibliography:

[1] Krivokolesko V.P. and Tsikh A.K., Integral Representations in Linearly Convex Polyhedra, Siberian Mathematical Journal, Vol. 46, No.3, 579-593 (2005). Sib. Mat. J, Vol. 46, No.3, 579-593 (2005).

[2] Prudnikov A.P., Brychkov Yu.A., Marithev O.I. Integrals and rows [in Russian], Moskov, Nauka (1981). (Received June 01, 2009)