HYPERGEOMETRIC FUNCTIONS OF SEVERAL VARIABLES

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ANNOTATION
In this article, the one-valued solution of the coupling conditional boundary value problem in integral form on the line of change of type for the equation of mixed parabolic-hyperbolic type is proved.

Keywords: Mix type equation; boundary issue; integral connection condition; integral equations method.

The Gaussian hypergeometric function can be expressed by the following line[1]

$$F(a,b;,c;z)=F\left[\begin{matrix} a,b; \\ x \\ c; \end{matrix}\right]=\sum_{n=0}^{\infty}\frac{(a)_n(b)_n z^n}{(c)_n}\cdot\frac{z^n}{n!},\ |z|<1,(*)$$

Here it a,b,c z does not depend on . The parameters a,b,c and z variables can take complex values and $c\neq 0,-1,-2,\dots,$ are assumed to be and . $(\lambda)_v$ expression denotes the Pochhammer symbol: the set of natural numbers $(\lambda)_0:=1,\ (\lambda)_v:=\lambda(\lambda+1)\dots(\lambda+v-1),\ v\in N,$ written in the form of $(\lambda)_v=\dfrac{\Gamma(\lambda+v)}{\Gamma(\lambda)},\quad v\in\{0\}\cup N;\ N:=\{1,2,3,\dots\}$ the gamma function $\Gamma(z)$. Let a multilevel sequence be given

$$\sum_{|k|=0}^{\infty}A(k)x_1^{k_1}x_2^{k_2}\dots x_n^{k_n},$$

where the summation is carried out by multiple index k $k:=(k_1,\dots,k_n)$. non-negative integer components $k_i\geq 0,\ i=\overline{1,n},$ for them, usually, $|k|:=k_1+\dots+k_{n;}$ coefficients $A(k)$ and variables $x_1,\dots,x_n$ can accept complex values.

Definition (1) A polynomial series (*) n is a hypergeometric series if the following relation holds

$$f_f(k)=\frac{P_j(k)}{Q_f(k)},$$

Here P_j and Q_j are multinomial polynomials, respectively, p_j and q_j are of degree k. Q_j is assumed to have P_j a coefficient of; k_j+1; and Q_j there are no general factors, $k_j+1\,(j=\overline{1,n})$.with the possible exception.

Definition 1.1.2. $p_1,...,p_n,\ q_1,...,q_n$ the largest of the numbers is called the order of the hypergeometric series (1.1.1).

Definition (2). If all $p_1,...,p_n,\ q_1,...,q_n$ the numbers are the same, that is $p_1=...=p_n=q_1=...=q_n$, then the hypergeometric series (1.1.1) is called complete. [2]In particular, Gorn studied the hypergeometric series of the latter. He found that, in addition to some series, can be represented by series from one variable or by the product of two hypergeometric series, each of which depends on one variable, basically there are 34 different convergent series of order 2. Two o ' variable, there are 14 complete series $p_1=q_1=p_2=q_2=2$

$$F_1(a,b,c;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}(c)_n}{(d)_{m+n}m!n!}x^my^n,\ |x|<1,\ |y|<1, \quad (1)$$

$$F_2(a,b,c;d,e;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}(b)_m(c)_n}{(d)_m(e)_n m!n!}x^my^n,\ |x|+|y|<1, \quad (2)$$

$$F_3(a,b;c,d;e;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_n(c)_m(d)_n}{(e)_{m+n}m!n!}x^my^n,\ |x|<1,\ |y|<1, \quad (3)$$

$$F_4(a,b;c;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}(b)_{m+n}}{(c)_m(d)_n m!n!}x^my^n,\ \sqrt{x}+\sqrt{y}<1, \quad (4)$$

$$G_1(a,b,c;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}(b)_{n-m}(c)_{m-n}}{m!n!}x^my^n, \quad (5)$$

$$G_2(a,b,c,d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_n(c)_{n-m}(d)_{m-n}}{m!n!}x^my^n, \quad (6)$$

$$H_1(a,b,c;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m-n}(b)_{m+n}(c)_n}{(d)_m m!n!}x^my^n, \quad (7)$$

$$H_2(a,b,c;d;e;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m-n}(b)_m(c)_n(d)_n}{(e)_m m!n!}x^my^n, \quad (8)$$

and 20 concatenated series are the limit forms for complete series and for which $p_1\le q_1=2,\ p_2\le q_2=2$, and $p_1\,va\,p_2$ cannot be equal to two at the same time, for example

$$\Phi_1(a,b,c;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}(b)_m}{(c)_{m+n}m!n!}x^my^n,\ |x|<1, \quad (9)$$

$$\Phi_2(a,b;c;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_m}{(c)_{m+n}m!n!}x^my^n, \quad (10)$$

$$\Phi_3(a;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m}{(d)_{m+n}m!n!}x^m y^n, \qquad (11)$$

$$\Psi_1(a,b;c,d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m}{(c)_m(d)_n m!n!}x^m y^n,\ |x|<1, \qquad (12)$$

$$\Psi_2(a;b,d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m+n}}{(b)_m(d)_n m!n!}x^m y^n, \qquad (13)$$

$$\Xi_1(a,b,c;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_n(c)_m}{(d)_{m+n}m!n!}x^m y^n,\ |x|<1, \qquad (14)$$

$$\Xi_2(a,b;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_m}{(d)_{m+n}m!n!}x^m y^n,\ |x|<1, \qquad (15)$$

$$\Gamma_1(a,b,c;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_m(b)_{n-m}(c)_{m-n}}{m!n!}x^m y^n,\ |x|<1, \qquad (16)$$

$$\Gamma_2(b,c;x,y)=\sum_{m,n=0}^{\infty}\frac{(b)_{n-m}(c)_{m-n}}{m!n!}x^m y^n, \qquad (17)$$

$$H_1(a,b;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m-n}(b)_{m+n}}{(d)_m m!n!}x^m y^n,\ |x|<1, \qquad (18)$$

$$H_2(a,b,c;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m-n}(b)_m(c)_n}{(d)_m m!n!}x^m y^n,\ |x|<1, \qquad (19)$$

$$H_3(a,b;d;x,y)=\sum_{m,n=0}^{\infty}\frac{(a)_{m-n}(b)_m}{(d)_m m!n!}x^m y^n,\ |x|<1, \qquad (20)$$

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