Volume 13 Issue 52
Originally issued as F11

Global Journal of Science Frontier Research
Mathematics and Decision Sciences
Volume 13 Issue 11 Version 1.0 Year 2013
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Creation of a Summation Formula Attached with Recurrence Relation and Hypergeometric Function

By Jai Bhagwan & Salahuddin

P.D.M College Of Engineering, India

Abstract- The main aim of present paper is the creation of a summation formula attached with recurrence relation and Hypergeometric function. We have used computational method using Mathematical.

GJSFR-F Classification : *MSC 2010: 33C05, 33C20, 33C45, 33C60, 33C70*

Strictly as per the compliance and regulations of:

© 2013. Jai Bhagwan & Salahuddin. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Notes

Creation of a Summation Formula Attached with Recurrence Relation and Hypergeometric Function

Jai Bhagwan [α] & Salahuddin [σ]

Abstract- The main aim of present paper is the creation of a summation formula attached with recurrence relation and Hypergeometric function. We have used computational method using Mathematical.

I. Introduction

a) Generalized Hypergeometric Functions

A generalized hypergeometric function ${}_pF_q(a_1,...,a_p;b_1,...,b_q;z)$ is a function which can be defined in the form of a hypergeometric series, i.e., a series for which the ratio of successive terms can be written

$$\frac{c_{k+1}}{c_k}=\frac{P(k)}{Q(k)}=\frac{(k+a_1)(k+a_2)...(k+a_p)}{(k+b_1)(K+b_2)...(k+b_q)(k+1)}\ z. \tag{1}$$

Where $k+1$ in the denominator is present for historical reasons of notation[Koepf p.12(2.9)], and the resulting generalized hypergeometric function is written

$${}_pF_q\left[\begin{array}{ccc} a_1,a_2,\cdots,a_p & ; & \\ & & z \\ b_1,b_2,\cdots,b_q & ; & \end{array}\right]=\sum_{k=0}^{\infty}\frac{(a_1)_k(a_2)_k\cdots(a_p)_k z^k}{(b_1)_k(b_2)_k\cdots(b_q)_k k!} \tag{2}$$

or

$${}_pF_q\left[\begin{array}{ccc} (a_p) & ; & \\ & & z \\ (b_q) & ; & \end{array}\right]=\sum_{k=0}^{\infty}\frac{((a_p))_k z^k}{((b_q))_k k!} \tag{3}$$

where the parameters $b_1,b_2,\cdots,b_q$ are positive integers.

The ${}_pF_q$ series converges for all finite z if $p\leq q$, converges for $\mid z \mid< 1$ if $p=q+1$, diverges for all z , $z\neq 0$ if $p>q+1$[Luke p.156(3)].

The function ${}_2F_1(a,b;c;z)$ corresponding to $p=2,q=1$, is the first hypergeometric function to be studied (and, in general, arises the most frequently in physical problems), and so is frequently known as "the" hypergeometric equation or, more explicitly, Gauss's hypergeometric function [Gauss p.123-162]. To confuse matters even more, the term "hypergeometric function" is less commonly used to mean closed form, and "hypergeometric series" is sometimes used to mean hypergeometric function.

Authors α σ : P.D.M College of Engineering, Bahadurgarh, Haryana, India. e-mails: sludn@yahoo.com, vsludn@gmail.com

© 2013 Global Journals Inc. (US)

The hypergeometric functions are solutions of Gaussian hypergeometric linear differential equation of second order

$$z(1-z)y'' + [c-(a+b+1)z]y' - aby = 0 \tag{4}$$

The solution of this equation is

$$y = A_0\Big[1 + \frac{ab}{1!\ c}z + \frac{a(a+1)b(b+1)}{2!\ c(c+1)}z^2 + \cdots\cdots\Big] \tag{5}$$

This is the so-called regular solution, denoted

$${}_2F_1(a,b;c;z) = \Big[1 + \frac{ab}{1!\ c}z + \frac{a(a+1)b(b+1)}{2!\ c(c+1)}z^2 + \cdots\cdots\Big] = \sum_{k=0}^{\infty}\frac{(a)_k\ (b)_k z^k}{(c)_k k!} \tag{6}$$

which converges if c is not a negative integer for all $\mid z \mid < 1$ and on the unit circle $\mid z \mid = 1$ if $R(c-a-b) > 0$.

It is known as Gauss hypergeometric function in terms of Pochhammer symbol $(a)_k$ or generalized factorial function.

Many of the common mathematical functions can be expressed in terms of the hypergeometric function. Some typical examples are

$$(1-z)^{-a} = z\ {}_2F_1(1,1;2;-z) \tag{7}$$

$$\sin^{-1} z = z\ {}_2F_1(\frac{1}{2},\frac{1}{2};\frac{3}{2};z^2) \tag{8}$$

b) *Gauss' Relations For Contiguous Functions*

The six functions $F(a\pm1,b;c;z), F(a,b\pm1;c;z), F(a,b;c\pm1;z)$ are called contiguous to $F(a,b;c;z)$. Relation between $F(a,b;c;z)$ and any two contiguous functions have been given by Gauss.

[Abramowitz p.558(15.2.19)]

$$(a-b)\ (1-z)\ {}_2F_1\left[\begin{array}{cc} a, & b\ ; \\ c & ;\end{array} z\right] = (c-b)\ {}_2F_1\left[\begin{array}{cc} a, & b-1\ ; \\ c & ;\end{array} z\right] + (a-c)\ {}_2F_1\left[\begin{array}{cc} a-1, & b\ ; \\ c\ ; & \end{array} z\right] \tag{9}$$

c) *Recurrence Relation*

In mathematics, a recurrence relation is an equation that recursively defines a sequence, once one or more initial terms are given: each further term of the sequence is defined as a function of the preceding terms.The recurrence relation of Gamma function is defined by [Temme p.42(3.1.1)]

$$\Gamma(z+1) = z\ \Gamma(z) \tag{10}$$

d) *Legendre's Duplication Formula*

Following Bells and Wong [p.26(2.3.1)], we have

$$\sqrt{\pi}\ \Gamma(2z) = 2^{(2z-1)}\ \Gamma(z)\ \Gamma\left(z+\frac{1}{2}\right) \tag{11}$$

$$\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi} = \frac{2^{(b-1)}\ \Gamma(\frac{b}{2})\ \Gamma(\frac{b+1}{2})}{\Gamma(b)} \tag{12}$$

© 2013 Global Journals Inc (US)

$$= \frac{2^{(a-1)}\ \Gamma(\frac{a}{2})\ \Gamma(\frac{a+1}{2})}{\Gamma(a)} \tag{13}$$

Following Prudnikov, Brychkov & Marichev [p.491.(7.3.7.3)], we have

$${}_2F_1\left[\begin{array}{cc} a, & b \\ \frac{a+b-1}{2}; & \end{array}\ \frac{1}{2}\right] = \sqrt{\pi}\left[\frac{\Gamma(\frac{a+b+1}{2})}{\Gamma(\frac{a+1}{2})\Gamma(\frac{b+1}{2})} + \frac{2\ \Gamma(\frac{a+b-1}{2})}{\Gamma(a)\Gamma(b)}\right] \tag{14}$$

Now using Legendre's duplication formula and Recurrence relation for Gamma function, the above formula can be written in the form

$${}_2F_1\left[\begin{array}{cc} a, & b \\ \frac{a+b-1}{2}; & \end{array}\ \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-1}{2})}{\Gamma(b)}\left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-1}{2})} + \frac{2^{(a-b+1)}\ \Gamma(\frac{a}{2})\ \Gamma(\frac{a+1}{2})}{\{\Gamma(a)\}^2} + \frac{\Gamma(\frac{b+2}{2})}{\Gamma(\frac{a+1}{2})}\right] \tag{15}$$

It is noted that the above formula [Prudnikov,491.(7.3.7.3)], i.e. equation(14) or (15) is not correct.The correct form of equation(14) or (15) is obtained by [Asish et. al(2008), p.337(10)]

$${}_2F_1\left[\begin{array}{cc} a, & b \\ \frac{a+b-1}{2}; & \end{array}\ \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-1}{2})}{\Gamma(b)}\left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-1}{2})}\left\{\frac{(b+a-1)}{(a-1)}\right\} + \frac{2\ \Gamma(\frac{b+1}{2})}{\Gamma(\frac{a}{2})}\right] \tag{16}$$

Involving the derived formula obtained by [Salahuddin,p .45(9)], we establish the main formula.

II. Main Summation Formula

For the main formula $a \neq b$

For $a < 1$ and $a > 30$

$${}_2F_1\left[\begin{array}{cc} a, & b \\ \frac{a+b-30}{2}; & \end{array}\ \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-30}{2})}{(a-b)\Gamma(b)}\left[\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-29}{2})}\left\{\frac{(-42849873690624000a)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} + \right.\right.$$

$$+\frac{(102174938785382400a^2 - 90168185255362560a^3 + 48238440075952128a^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} +$$

$$+\frac{(-14222757092524032a^5 + 3434748504629248a^6 - 476013869035520a^7 + 63240546512640a^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} +$$

$$+\frac{(-4603989262336a^9 + 362770106624a^{10} - 14085527040a^{11} + 665833376a^{12} - 12792832a^{13})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} +$$

$$+\frac{(343728a^{14} - 2480a^{15} + 31a^{16} + 42849873690624000b - 31082092167168000ab)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} +$$

$$\left.\left.+\frac{(-73098173806018560a^2b + 10886804782527283 2a^3b - 57797146289504256a^4b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}} +\right\}\right.$$

© 2013 Global Journals Inc. (US)

$$+\frac{(22066910445879296a^5b-4278218966429696a^6b+807376117319680a^7b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-74955432767488a^8b+8169315368448a^9b-385635936768a^{10}b+25593453184a^{11}b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-582589696a^{12}b+23404256a^{13}b-198896a^{14}b+4464a^{15}b-71092846618214400b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(112755981161594880ab^2-36482063700197376a^2b^2-29343138531508224a^3b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(30395328111255552a^4b^2-10197276680204288a^5b^2+2946095411127296a^6b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-374548696047616a^7b^2+56962219478272a^8b^2-3393695599104a^9b^2+308716484928a^{10}b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-8514867712a^{11}b^2+480008464a^{12}b^2-4847408a^{13}b^2+165416a^{14}b^2+5051037789978624 0b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-99910969798164480ab^3+54967053635026944a^2b^3-10666441061793792a^3b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-4166767625613312a^4b^3+3206675295074304a^5b^3-686051126108160a^6b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(156167659677696a^7b^3-12540657489408a^8b^3+1572782347392a^9b^3-54323189760a^{10}b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(4180393152a^{11}b^3-51048816a^{12}b^3+2459664a^{13}b^3-20713454402863104b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(40852434546720768ab^4-32041240778039296a^2b^4+8698430393331712a^3b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-1154676393076224a^4b^4-247159742668800a^5b^4+147864940085760a^6b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-19581576698880a^7b^4+3617566362720a^8b^4-166428633600a^9b^4+17522948400a^{10}b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc (US)

Notes

$$+\frac{(-266463600a^{11}b^4+17530500a^{12}b^4+55435537317888800b^5-12155400984281088ab^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(8180404586819584a^2b^5-3671679306500096a^3b^5+552177907875840a^4b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-54103342402560a^5b^5-6502833792000a^6b^5+3126362400000a^7b^5-233673258240a^8b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(35839030560a^9b^5-719559600a^{10}b^5+64512240a^{11}b^5-10339042376499 20b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(2099766917263360ab^6-1867829847333888a^2b^6+595797693046784a^3b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-178743343074816a^4b^6+15207496657920a^5b^6-1156337239680a^6b^6-73365304320a^7b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(29075170320a^8b^6-937908720a^9b^6+121580760a^{10}b^6+1396752438681 60b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-315216253958144ab^7+210439757914112a^2b^7-108338835331072a^3b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(17944242066432a^4b^7-3924412035840a^5b^7+177220085760a^6b^7-10838056320a^7b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-282861360a^8b^7+94287120a^9b^7-139855691655 68b^8+27853051633664ab^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-25906772757248a^2b^8+7697887351296a^3b^8-2669359676832a^4b^8+222457190400a^5b^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-37501461360a^6b^8+699709680a^7b^8-35357670a^8b^8+10505763840 00b^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-2375213023744ab^9+1454416768512a^2b^9-790386876288a^3b^9+108636023040a^4b^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-27632383200a^5b^9+918058800a^6b^9-124062000a^7b^9-59398127360b^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(111928327680ab^{10}-105528303296a^2b^{10}+25592473088a^3b^{10}-9433933392a^4b^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(490854000a^5b^{10}-96768360a^6b^{10}+2513871360b^{11}-5584355712ab^{11}+2860642304a^2b^{11})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-1587936064a^3b^{11}+134073264a^4b^{11}-36463440a^5b^{11}-78393952b^{12}+132474368ab^{12})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-123782256a^2b^{12}+18886192a^3b^{12}-7152444a^4b^{12}+1747200b^{13}-3719968ab^{13})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{-704816a^3b^{13}-26320b^{14}+34480ab^{14}-31000a^2b^{14}+240b^{15}-464ab^{15}-b^{16})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}\Big\}+$$

$$+\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-30}{2})}\Big\{\frac{(-42849873690624000a+71092846618214400a^2-50510377899786240a^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(20713454402863104a^4-5543553731788800a^5+1033904237649920a^6-139675243868160a^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(13985569165568a^8-1050576384000a^9+59398127360a^{10}-2513871360a^{11}+78393952a^{12})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-1747200a^{13}+26320a^{14}-240a^{15}+a^{16}+42849873690624000b+31082092167168000ab)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-112755981161594880a^2b+9991096979816448 0a^3b-40852434546720768a^4b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(12155400984281088a^5b-2099766917263360a^6b+315216253958144a^7b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-27853051633664a^8b+2375213023744a^9b-111928327680a^{10}b+5584355712a^{11}b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-132474368a^{12}b+3719968a^{13}b-34480a^{14}b+464a^{15}b-1021749387853824 00b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(73098173806018560ab^2+36482063700197376a^2b^2-5496705363502 6944a^3b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc (US)

$$+\frac{(32041240778039296a^4b^2-8180404586819584a^5b^2+1867829847333888a^6b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-210439757914112a^7b^2+25906772757248a^8b^2-1454416768512a^9b^2+105528303296a^{10}b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-2860642304a^{11}b^2+123782256a^{12}b^2-1274224a^{13}b^2+31000a^{14}b^2+90168185255362560b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-108868047825272832ab^3+29343138531508224a^2b^3+10666441061793792a^3b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-8698430393331712a^4b^3+3671679306500096a^5b^3-595797693046784a^6b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(108338835331072a^7b^3-7697887351296a^8b^3+790386876288a^9b^3-25592473088a^{10}b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(1587936064a^{11}b^3-18886192a^{12}b^3+704816a^{13}b^3-482384400759521280b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(57797146289504256ab^4-30395328111255552a^2b^4+4166767625613312a^3b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(11546763930762240a^4b^4-552177907875840a^5b^4+1787433430748160a^6b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-179442420664320a^7b^4+26693596768320a^8b^4-1086360230400a^9b^4+94339333920a^{10}b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-1340732640a^{11}b^4+71524440a^{12}b^4+14222757092524032b^5-22066910445879296ab^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(101972766802042880a^2b^5-3206675295074304a^3b^5+247159742668800a^4b^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(541033424025600a^5b^5-15207496657920a^6b^5+3924412035840a^7b^5-222457190400a^8b^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(276323832000a^9b^5-4908540000a^{10}b^5+364634400a^{11}b^5-3434748504629248b^6)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(4278218966429696ab^6-2946095411127296a^2b^6+686051126108160a^3b^6)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-147864940085760a^4b^6+6502833792000a^5b^6+1156337239680a^6b^6-177220085760a^7b^6)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(37501461360a^8b^6-918058800a^9b^6+96768360a^{10}b^6+4760138690355520b^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-807376117319680ab^7+374548696047616a^2b^7-156167659677696a^3b^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(19581576698880a^4b^7-3126362400000a^5b^7+73365304320a^6b^7+10838056320a^7b^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-699709680a^8b^7+124062000a^9b^7-632405465126 40b^8+74955432767488ab^8)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-56962219478272a^2b^8+12540657489408a^3b^8-3617566362720a^4b^8+233673258240a^5b^8)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-29075170320a^6b^8+282861360a^7b^8+35357670a^8b^8+46039892623 36b^9)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-8169315368448ab^9+3393695599104a^2b^9-1572782347392a^3b^9+166428633600a^4b^9)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-35839030560a^5b^9+937908720a^6b^9-94287120a^7b^9-362770106624b^{10})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(385635936768ab^{10}-308716484928a^2b^{10}+54323189760a^3b^{10}-17522948400a^4b^{10})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(719559600a^5b^{10}-121580760a^6b^{10}+14085527040b^{11}-25593453184ab^{11}+8514867712a^2b^{11})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-4180393152a^3b^{11}+266463600a^4b^{11}-64512240a^5b^{11}-665833376b^{12}+582589696ab^{12})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-480008464a^2b^{12}+51048816a^3b^{12}-17530500a^4b^{12}+12792832b^{13}-23404256ab^{13})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc (US)

$$+\frac{(4847408a^2b^{13}-2459664a^3b^{13}-343728b^{14}+198896ab^{14}-165416a^2b^{14}+2480b^{15})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-4464ab^{15}-31b^{16})}{\prod_{\eta=1}^{15}\{a-2\eta\}}\Bigg\}\Bigg] \tag{17}$$

Notes

III. Evaluation Of Main Summation Formula

Substituting $c=\frac{a+b-30}{2}$ and $z=\frac{1}{2}$ in equation (24), we get

$$(a-b)\,{}_2F_1\left[\begin{matrix}a,\ b\\ \frac{a+b-30}{2}\end{matrix};\ \frac{1}{2}\right]=(a-b-30)\,{}_2F_1\left[\begin{matrix}a,\ b-1\\ \frac{a+b-30}{2}\end{matrix};\ \frac{1}{2}\right]+(a-b+30)\,{}_2F_1\left[\begin{matrix}a-1,\ b\\ \frac{a+b-30}{2}\end{matrix};\ \frac{1}{2}\right]$$

Now involving the the formula obtained by salahuddin[Salahuddin,p .45(9)], we get

$$L.H.S=\frac{2^{(b-1)}\,\Gamma(\frac{a+b-30}{2})}{\Gamma(b)}\Bigg[\frac{(a-b-30)}{(a-b+1)}\,\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-29}{2})}\Bigg\{\frac{(-42849873690624000)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(56468406848716800a+1009094308134912 0a^2-45646821227298816a^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(30119994532429824a^4-10659242374635520a^5+2384177957457920a^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-372420039991552a^7+41100528816128a^8-3372406380160a^9+199271883200a^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-8841030848a^{11}+271930672a^{12}-6056120a^{13}+80260a^{14}-659a^{15}+a^{16})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1139427203088838400b-19243264077987840 0ab+7117947137654784 0a^2b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(31565349178638336a^3b-3599035135389696 0a^4b+1430731569922048 0a^5b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-3391367994865920a^6b+532460361363712a^7b-59560797031680a^8b+4745684818240a^9b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-279195240480a^{10}b+11619237968a^{11}b-349449360a^{12}b+6800780a^{13}b-84165a^{14}b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(434a^{15}b-1216032245180006 40b^2+22966332931473 4080ab^2-1325623103491276 80a^2b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(17716361173647360a^3b^2+12817606114037760a^4b^2-7268501921936640a^5b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1903248210151680a^6b^2-309340014067200a^7b^2+34669345543680a^8b^2-2718132397440a^9b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(154142180400a^{10}b^2-6044516400a^{11}b^2+166890360a^{12}b^2-2737455a^{13}b^2+26970a^{14}b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(7122383230264934 4b^3-1424112696256757 76ab^3+9650273562009600 0a^2b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-27158505721528320a^3b^3+1046052696318720a^4b^3+1645411005646080a^5b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-5401448380416 00a^6b^3+9742234754688 0a^7b^3-1068902527824 0a^8b^3+855046307760a^9b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-435878352 00a^{10}b^3+1695549960a^{11}b^3-35236305a^{12}b^3+566370a^{13}b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-2625700813465190 4b^4+5417050598191104 0ab^4-3945572561479680 0a^2b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(13679204053597440a^3b^4-2120890334688000a^4b^4-19025526931200a^5b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(8492024481600 0a^6b^4-1667701385280 0a^7b^4+211650203520 0a^8b^4-145414149000a^9b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(8158694700a^{1}0b^4-212995575a^{11}b^4+5259150a^{12}b^4+6577457969438720b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-1382028646727 6800ab^5+1039367056500 8640a^2b^5-391808130258 0480a^3b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(791845793625600a^4b^5-69492783427200a^5b^5-2483999138880a^6b^5+1910624274720a^7b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc (US)

Notes

$$+\frac{(-212369331600a^8b^5+19049720100a^9b^5-641090385a^{10}b^5+24192090a^{11}b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-11735794815180 80b^6+2469322022918400ab^6-1911816899339520a^2b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(732192289313280a^3b^6-163543093881600a^4b^6+20082084664320a^5b^6-941035082400a^6b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-48979677600a^7b^6+18237114000a^8b^6-901000275a^9b^6+56448210a^{10}b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1536608130337728b^7-326583853541632ab^7+245643692083200a^2b^7-99106124778240a^3b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(21459053764800a^4b^7-3012890332320a^5b^7+216761126400a^6b^7-4242920400a^7b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-265182525a^8b^7+58929450a^9b^7-150361455549568b^8+31156475560320ab^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-24451722638400a^2b^8+8940052710720a^3b^8-2152280437200a^4b^8+260046358200a^5b^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-23317452900a^6b^8+795547575a^7b^8+1109974511360b^9-2340242526400ab^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1645789231200a^2b^9-673510158960a^3b^9+125836626000a^4b^9-19235813100a^5b^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1052976225a^6b^9-58929450a^7b^9-61911998720b^{10}+122169740160ab^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-95144334480a^2b^{10}+29274532560a^3b^{10}-7159456200a^4b^{10}+568514115a^5b^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-56448210a^6b^{10}+2592265312b^{11}-5337467408ab^{11}+3197563200a^2b^{11}-1300061880a^3b^{11})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(155144925a^4b^{11}-24192090a^5b^{11}-80141152b^{12}+142613640ab^{12})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(-108689100a^2b^{12}+21562515a^3b^{12}-5259150a^4b^{12}+1773520b^{13}-3493700ab^{13})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(1415925a^2b^{13}-566370a^3b^{13}-26560b^{14}+36735ab^{14}-26970a^2b^{14}+241b^{15})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-434ab^{15}-b^{16})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}\Big\}+\frac{(a-b-30)(b-1)}{(a-b+1)}\ \frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-30}{2})}\Big\{\frac{(42849873690624000)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-26814643804569600a-21476290178580480a^2+29081047157637120a^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-14200532432486400a^4+4036298413056000a^5-759685713346560a^6+100366817591040a^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-9589432195200a^8+671530516800a^9-34499905440a^{10}+1285480560a^{11}-33797400a^{12})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(594300a^{13}-6270a^{14}+30a^{15}-100746609662361600b+10536962308964352 0ab)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-18497359471509504a^2b-1969721949428736a^3b+13886382286397440a^4b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-4339068030189568a^5b+857574469125888a^6b-113217893178368a^7b+10859483768000a^8b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-731396205504a^9b+36817157936a^{10}b-1257372896a^{11}b+31361460a^{12}b-443548a^{13}b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(4030a^{14}b+92490335838535680b^2-11398766487109632 0ab^2+4638361874182963 2a^2b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-1926305147437056a^3b^2-4380147255427072a^4b^2+1878105598159616a^5b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-386934853266944a^6b^2+54537090886912a^7b^2-4938029127456a^8b^2+342285504528a^9b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-15032099888a^{10}b^2+523484104a^{11}b^2-9419722a^{12}b^2+138446a^{13}b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

Notes

© 2013 Global Journals Inc (US)

Notes

$$+\frac{(-46632165832065024b^3+6216357192361574 4ab^3-30822099684507648a^2b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(6525530932051968a^3b^3+131032468218624a^4b^3-348720370467840a^5b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(98495967926016a^6b^3-13207757720832a^7b^3+1340626529232a^8b^3-76951667040a^9b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(3775087992a^{10}b^3-84987864a^{11}b^3+1893294a^{12}b^3+14859663097823232b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-20711447922302976ab^4+11169873454153728a^2b^4-2983163756323584a^3b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(363675061996800a^4b^4+20359470898560a^5b^4-11353733939520a^6b^4+2209706471520a^7b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-178725335400a^8b^4+13011676500a^9b^4-369893550a^{10}b^4+12271350a^{11}b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-32711935804129 28b^5+4569102979137536ab^5-2610314589022976a^2b^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(753958524042240a^3b^5-120686089584000a^4b^5+8674613539200a^5b^5+705515781600a^6b^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-150958641600a^7b^5+20749369500a^8b^5-787793700a^9b^5+40320150a^{10}b^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(5050255128816640b^6-733037562791680ab^6+405911801172480a^2b^6-127441219311360a^3b^6)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(21411848928960a^4b^6-2132804429280a^5b^6+86079178080a^6b^6+8858026800a^7b^6)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-664352010a^8b^6+65132550a^9b^6-59551759843072b^7+81170061386752ab^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-48474589768960a^2b^7+13733274514176a^3b^7-2650892519520a^4b^7+253026930240a^5b^7)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(-15527599920a^6b^7+282861360a^7b^7+35357670a^8b^7+4947215345536b^8)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-7286981375168ab^8+3740645877984a^2b^8-1232794859472a^3b^8+183751464600a^4b^8)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-22893160860a^5b^8+1003041270a^6b^8-35357670a^7b^8-3391917632640b^9+424211354688ab^9)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-257569498128a^2b^9+60858560160a^3b^9-12407548500a^4b^9+800199900a^5b^9)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-65132550a^6b^9+152795198400b^10-22632383280ab^{10}+9573055440a^2b^{10})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-3218599800a^3b^{10}+303277650a^4b^{10}-40320150a^5b^{10}-621837424b^{11}+649171744ab^{11})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-397825480a^2b^{11}+58621992a^3b^{11}-12271350a^4b^{11}+13939432b^{12}-20735156ab^{12})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(5539638a^2b^{12}-1893294a^3b^{12}-323708b^{13}+223076ab^{13}-138446a^2b^{13}+2690b^{14})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-4030ab^{14}-30b^{15})}{\prod_{\eta=1}^{15}\{a-2\eta\}}\Bigg\}\Bigg]+\frac{2^{(b-1)}\ \Gamma(\frac{a+b-30}{2})}{\Gamma(b)}\Bigg[\frac{(a-b+30)}{(a-b-1)}\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-30}{2})}\times$$

$$+\frac{(42849873690624000-1139427203088384 00a+1216032245180006 40a^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-71223832302649344a^3+26257008134651904a^4-6577457969438720a^5)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(1173579481518080a^6-153660813033728a^7+15036145549568a^8-1109974511360a^9)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(61911998720a^{10}-2592265312a^{11}+80141152a^{12}-1773520a^{13}+26560a^{14}-241a^{15}+a^{16})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-56468406848716800b+192432640779878400ab-229663329314734080a^2b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

Notes

© 2013 Global Journals Inc (US)

Notes

$$+\frac{(142411269625675776a^3b - 5417050598191104 0a^4b + 13820286467276800a^5b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-2469322022918400a^6b + 326583853541632a^7b - 31156475560320a^8b + 2340242526400a^9b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-122169740160a^{10}b + 5337467408a^{11}b - 142613640a^{12}b + 3493700a^{13}b - 36735a^{14}b)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(434a^{15}b - 10090943081349120b^2 - 7117947137654784 0ab^2 + 13256231034912768 0a^2b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-96502735620096000a^3b^2 + 39455725614796800a^4b^2 - 10393670565008640a^5b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(1911816899339520a^6b^2 - 245643692083200a^7b^2 + 24451722638400a^8b^2 - 1645789231200a^9b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(95144334480a^{10}b^2 - 3197563200a^{11}b^2 + 108689100a^{12}b^2 - 1415925a^{13}b^2 + 26970a^{14}b^2)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(456468212272988 16b^3 - 31565349178638336ab^3 - 17716361173647360a^2b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(27158505721528320a^3b^3 - 1367920405359744 0a^4b^3 + 3918081302580480a^5b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-732192289313280a^6b^3 + 99106124778240a^7b^3 - 8940052710720a^8b^3 + 673510158960a^9b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-29274532560a^{10}b^3 + 1300061880a^{11}b^3 - 21562515a^{12}b^3 + 566370a^{13}b^3)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-301199945324298 24b^4 + 35990351353896960ab^4 - 12817606114037760a^2b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-1046052696318720a^3b^4 + 2120890334688000a^4b^4 - 791845793625600a^5b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(163543093881600a^6b^4 - 21459053764800a^7b^4 + 2152280437200a^8b^4 - 125836626000a^9b^4)}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(7159456200a^{1}0b^{4}-155144925a^{11}b^{4}+5259150a^{12}b^{4}+10659242374635520b^{5})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-14307315699220480ab^{5}+7268501921936640a^{2}b^{5}-1645411005646080a^{3}b^{5})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(19025526931200a^{4}b^{5}+69492783427200a^{5}b^{5}-20082084664320a^{6}b^{5}+3012890332320a^{7}b^{5})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-260046358200a^{8}b^{5}+19235813100a^{9}b^{5}-568514115a^{10}b^{5}+24192090a^{11}b^{5})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-238417795745792 0b^{6}+3391367994865920ab^{6}-1903248210151680a^{2}b^{6})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(540144838041600a^{3}b^{6}-84920244816000a^{4}b^{6}+2483999138880a^{5}b^{6}+941035082400a^{6}b^{6})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-216761126400a^{7}b^{6}+23317452900a^{8}b^{6}-1052976225a^{9}b^{6}+56448210a^{10}b^{6})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(372420039991552b^{7}-532460361363712ab^{7}+309340014067200a^{2}b^{7}-97422347546880a^{3}b^{7})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(16677013852800a^{4}b^{7}-1910624274720a^{5}b^{7}+48979677600a^{6}b^{7}+4242920400a^{7}b^{7})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-795547575a^{8}b^{7}+58929450a^{9}b^{7}-411005288161 28b^{8}+59560797031680ab^{8})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-34669345543680a^{2}b^{8}+10689025278240a^{3}b^{8}-2116502035200a^{4}b^{8}+212369331600a^{5}b^{8})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-18237114000a^{6}b^{8}+265182525a^{7}b^{8}+3372406380160b^{9}-4745684818240ab^{9})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(2718132397440a^{2}b^{9}-855046307760a^{3}b^{9}+145414149000a^{4}b^{9}-19049720100a^{5}b^{9})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(901000275a^{6}b^{9}-58929450a^{7}b^{9}-199271883200b^{10}+279195240480ab^{10})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

© 2013 Global Journals Inc (US)

$$+\frac{(-154142180400a^2b^{10}+43587835200a^3b^{10}-8158694700a^4b^{10}+641090385a^5b^{10})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-56448210a^6b^{10}+8841030848b^{11}-11619237968ab^{11}+6044516400a^2b^{11}-1695549960a^3b^{11})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(212995575a^4b^{11}-24192090a^5b^{11}-271930672b^{12}+349449360ab^{12}-166890360a^2b^{12})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(35236305a^3b^{12}-5259150a^4b^{12}+6056120b^{13}-6800780ab^{13}+2737455a^2b^{13}-566370a^3b^{13})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+$$

$$+\frac{(-80260b^{14}+84165ab^{14}-26970a^2b^{14}+659b^{15}-434ab^{15}-b^{16})}{\prod_{\eta=1}^{15}\{a-2\eta\}}+\frac{(a-b+30)}{(a-b-1)}\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-29}{2})}\times$$

$$\times\Bigg\{\frac{(-42849873690624000+10074660966236160 0a-9249033583853568 0a^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(46632165832065024a^3-14859663097823232a^4+3271193580412928a^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-505025512816640a^6+59551759843072a^7-4947215345536a^8+339191763264a^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-15279519840a^{10}+621837424a^{11}-13939432a^{12}+323708a^{13}-2690a^{14}+30a^{15})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(26814643804569600b-10536962308964352 0ab+1139876648710963 20a^2b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-62163571923615744a^3b+20711447922302976a^4b-4569102979137536a^5b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(733037562791680a^6b-81170061386752a^7b+7286981375168a^8b-424211354688a^9b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(22632383280a^{10}b-649171744a^{11}b+20735156a^{12}b-223076a^{13}b+4030a^{14}b)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(21476290178580480b^2+18497359471509504ab^2-46383618741829632a^2b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

© 2013 Global Journals Inc. (US)

$$+\frac{(30822099684507648a^3b^2-11169873454153728a^4b^2+2610314589022976a^5b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-405911801172480a^6b^2+48474589768960a^7b^2-3740645877984a^8b^2+257569498128a^9b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-9573055440a^{10}b^2+397825480a^{11}b^2-5539638a^{12}b^2+138446a^{13}b^2)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-29081047157637120b^3+19697219949428736ab^3+1926305147437056a^2b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-6525530932051968a^3b^3+2983163756323584a^4b^3-753958524042240a^5b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(127441219311360a^6b^3-13733274514176a^7b^3+1232794859472a^8b^3-60858560160a^9b^3)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(3218599800a^10b^3-58621992a^{11}b^3+1893294a^{12}b^3+142005324324864400b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-13886382286397440ab^4+4380147255427072a^2b^4-131032468218624a^3b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-363675061996800a^4b^4+120686089584000a^5b^4-21411848928960a^6b^4+2650892519520a^7b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-183751464600a^8b^4+12407548500a^9b^4-303277650a^{10}b^4+12271350a^{11}b^4)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-40362984130560000b^5+4339068030189568ab^5-1878105598159616a^2b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(348720370467840a^3b^5-20359470898560a^4b^5-8674613539200a^5b^5+2132804429280a^6b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-253026930240a^7b^5+22893160860a^8b^5-800199900a^9b^5+40320150a^{10}b^5)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(7596857133465600b^6-857574469125888ab^6+386934853266944a^2b^6-98495967926016a^3b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

Notes

© 2013 Global Journals Inc (US)

$$+\frac{(+11353733939520a^4b^6-705515781600a^5b^6-86079178080a^6b^6+15527599920a^7b^6)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-1003041270a^8b^6+65132550a^9b^6-100366817591040b^7+113217893178368ab^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-54537090886912a^2b^7+13207757720832a^3b^7-2209706471520a^4b^7+150958641600a^5b^7)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-8858026800a^6b^7-282861360a^7b^7+35357670a^8b^7+9589432195200b^8-10859483768000ab^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(4938029127456a^2b^8-1340626529232a^3b^8+178725335400a^4b^8-20749369500a^5b^8)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(664352010a^6b^8-35357670a^7b^8-6715305168000b^9+731396205504ab^9-342285504528a^2b^9)}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(76951667040a^3b^9-13011676500a^4b^9+787793700a^5b^9-65132550a^6b^9+34499905440b^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-36817157936ab^{10}+15032099888a^2b^{10}-3775087992a^3b^{10}+369893550a^4b^{10})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-40320150a^5b^{10}-1285480560b^11+1257372896ab^{11}-523484104a^2b^{11}+84987864a^3b^{11})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(-12271350a^4b^{11}+33797400b^{12}-31361460ab^{12}+9419722a^2b^{12}-1893294a^3b^{12}-594300b^{13})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}+$$

$$+\frac{(443548ab^{13}-138446a^2b^{13}+6270b^{14}-4030ab^{14}-30b^{15})}{\prod_{\zeta=1}^{15}\{a-(2\zeta-1)\}}\Big\}\Big]$$

In this way, we get the main formula.

IV. Conclusion

In this paper we have derived a summation formula with the help of contiguous relation . However, the formula presented herein may be further developed to extend this result .Thus we can only hope that the development presented in this work will stimulate further interest and research in this important area of classical special functions. Just as the mathematical properties of the Gauss hypergeometric function are already of immense and significant utility in mathematical sciences and numerous other areas of pure and applied mathematics, the elucidation and discovery of the formula of hyperge-

© 2013 Global Journals Inc. (US)

ometric functions considered herein should certainly eventually prove useful to further developments in the broad areas alluded to above.

References Références Referencias

1. Abramowitz, Milton., A and Stegun, Irene; *Handbook of Mathematical Functions with Formulas , Graphs , and Mathematical Tables.* National Bureau of Standards, 1970.
2. Andrews, L.C. ; Special Function of mathematics for Engineers,second Edition, McGraw-Hill Co Inc., New York,1992.
3. Arora, Asish, Singh, Rahul , Salahuddin. ; Development of a family of summation formulae of half argument using Gauss and Bailey theorems , *Journal of Rajasthan Academy of Physical Sciences.*, 7(2008), 335-342.
4. Bells, Richard. Wong, Roderick; *Special Functions, A Graduate Text.* Cambridge Studies in Advanced Mathematics, 2010.
5. Gauss, C. F. ; Disquisitiones generales circa seriem infinitam ... , *Comm. soc. reg. sci. Gott. rec.*, 2(1813), 123-162.
6. Temme,N. M.; *Special functions: An introduction to the classical functions of Mathematical physics.* John Wiley and sons,Inc New York, 1996.
7. Koepf, W.; *Hypergeometric Summation: An Algorithmic Approach to Summation and Special Function Identities.* Braunschweig, Germany: Vieweg, 1998.
8. Luke, Y. L.; *Mathematical functions and their approximations.* Academic Press Inc., London,, 1975.
9. Prudnikov, A. P., Brychkov, Yu. A. and Marichev, O.I.; *Integrals and Series Vol. 3: More Special Functions.* Nauka, Moscow, 1986. Translated from the Russian by G.G. Gould, Gordon and Breach Science Publishers, New York, Philadelphia, London, Paris, Montreux, Tokyo, Melbourne, 1990.
10. Salahuddin. ; Creation of a Summation Formula Connected To Contiguous Relation and Hypergeometric Function , *Global Journal of Science Frontier Research.*, 11(2011), 39-56.

Notes

© 2013 Global Journals Inc (US)