

**A SUMMATION FORMULA IN THE FORM OF HYPERGEOMETRIC FUNCTION**

**ANITA<sup>1</sup> AND SALAHUDDIN\*<sup>2</sup>**

<sup>1</sup>Department of Mathematics,  
Prarambh School for Teacher Education, Jhajjar, Haryana, India.

<sup>2</sup>P. D. M University, Bahadurgarh, Haryana, India.

*(Received On: 16-03-19; Revised & Accepted On: 22-04-19)*

**ABSTRACT**

*The main aim of the present paper is to evaluate a summation formula of half argument associated with contiguous relation and recurrence relation of Gamma function.*

*Key words: Gaussian Hypergeometric function, Recurrence relation, Bailey summation theorem, Contiguous relation.*

*2010 MSC NO: 33C05, 33C20, 33C45, 33D50, 33D60.*

**I INTRODUCTION**

**Generalized Gaussian Hypergeometric function of one variable is defined by**

$${}_A F_B(a_1, a_2, \dots, a_A; b_1, b_2, \dots, b_B; z) = \sum_{k=0}^{\infty} \frac{(a_1)_k (a_2)_k \dots (a_A)_k z^k}{(b_1)_k (b_2)_k \dots (b_B)_k k!} \quad (1)$$

where the parameters  $b_1, b_2, \dots, b_B$  are neither zero nor negative integers and  $A, B$  are non negative integers.

**Contiguous Relation is defined by**

[Andrews p.363(9.16)]

$$(a-b) {}_2F_1(a, b; c; z) = a {}_2F_1(a+1, b; c; z) - b {}_2F_1(a, b+1; c; z) \quad (2)$$

**Recurrence relation is defined by**

$$\Gamma(\xi+1) = \xi \Gamma(\xi) \quad (3)$$

**Bailey summation theorem is defined by**

[Prudnikov, p.491(7.3.7.8)]

$${}_2F_1(a, 1-a; c; \frac{1}{2}) = \frac{\Gamma(\frac{c}{2})\Gamma(\frac{c+1}{2})}{\Gamma(\frac{c+a}{2})\Gamma(\frac{c+1-a}{2})} = \frac{\sqrt{\pi}\Gamma(c)}{2^{c-1}\Gamma(\frac{c+a}{2})\Gamma(\frac{c+1-a}{2})} \quad (4)$$

**II MAIN SUMMATION FORMULA**

$$\begin{aligned} {}_2F_1(a, -a-45; c; \frac{1}{2}) &= \frac{\sqrt{\pi}\Gamma(c)}{2^{c+45}} \left[ \frac{473001753307478027621742673920000}{\Gamma(\frac{c+a+45}{2})\Gamma(\frac{c-a}{2})} \right. \\ &+ \frac{-8618676521026321821831066058752000 a + 5021064466252175767796564189184000 a^2}{\Gamma(\frac{c+a+45}{2})\Gamma(\frac{c-a}{2})} \\ &+ \frac{-1265830859587639411511299437834240 a^3 + 136296198291146485760225766872064 a^4}{\Gamma(\frac{c+a+45}{2})\Gamma(\frac{c-a}{2})} \\ &+ \frac{-2327138124317135477938113765120 a^5 - 564588420362678304948747957312 a^6}{\Gamma(\frac{c+a+45}{2})\Gamma(\frac{c-a}{2})} \\ &+ \left. \frac{19592397851335351162530426720 a^7 + 1351628295107161702980624704 a^8}{\Gamma(\frac{c+a+45}{2})\Gamma(\frac{c-a}{2})} \right] \end{aligned}$$

**Corresponding Author: Salahuddin\*<sup>2</sup>**

**<sup>2</sup>P. D. M University, Bahadurgarh, Haryana, India.**

$$\begin{aligned}
 & + \frac{-32199507619034708118355200a^9 - 2240678236128846777921812a^{10} + 4432141216188201202830a^{11}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{1824292040956281724854a^{12} + 25907703288688705770a^{13} - 364430288951775442a^{14}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-12956808211195860a^{15} - 94570539667076a^{16} + 714057147540a^{17} + 15393770568a^{18} + 81620550a^{19}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{25454a^{20} - 990a^{21} - 2a^{22} + 11954264450360510623265385873408000c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-16113325647668692392741683095142400ac + 7329165105686261236614345997025280a^2c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-1436008400590232744522943211929600a^3c + 108814130099615489277455761858560a^4c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{1302626676090823729683662592000a^5c - 485075031864026109210376883200a^6c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{2727620865502579258488714240a^7c + 1029657453518478207376723968a^8c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{2147237369391908048112000a^9c - 1165415534508446689490880a^{10}c - 17366974859722502551680a^{11}c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{470890216726672673216a^{12}c + 14592772393690233600a^{13}c + 53487536820685440a^{14}c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-2521073169711360a^{15}c - 36308245454976a^{16}c - 109175299200a^{17}c + 1220183360a^{18}c + 10454400a^{19}c}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{23232a^{20}c + 12215279300750467928765252606361600c^2 - 12901197811659281853013388391874560a^2c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{4673677699311725282589662496325632a^2c^2 - 709918213538930785273979758632960a^3c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{34719024309631431317731129337856a^4c^2 + 1677077732081949317936444367360a^5c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-157369533494972296949078980864a^6c^2 - 2781510232965864527710460160a^7c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{269375867809525708935717888a^8c^2 + 5663746392958761501607200a^9c^2 - 184948204189359424636368a^{10}c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-6219880935488898369120a^{11}c^2 + 4275567734519825744a^{12}c^2 + 2167936235527233600a^{13}c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{25786033164265440a^{14}c^2 - 55397895917760a^{15}c^2 - 3107229957216a^{16}c^2 - 20421007200a^{17}c^2}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-16564240a^{18}c^2 + 237600a^{19}c^2 + 528a^{20}c^2 + 7078056541074017601030717356113920c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-60197852778789590976211176652800ac^3 + 1751465026851104366566452170588160a^2c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-203591213640570576220249654886400a^3c^3 + 5150913995047908116429732823040a^4c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{616654672199107875715735203840a^5c^3 - 24692681181715195982555836416a^6c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-1128860681971053571200460800a^7c^3 + 30103228213846880698045440a^8c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{1423193046548295534969600a^9c^3 - 5646738532807144225024a^{10}c^3 - 813092269701221452800a^{11}c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-8169920089122288640a^{12}c^3 + 107042602059993600a^{13}c^3 + 2517785027197440a^{14}c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{11873940249600a^{15}c^3 - 70985840640a^{16}c^3 - 815443200a^{17}c^3 - 2013440a^{18}c^3}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{2682453079047295379608234176282624c^4 - 1862952906977204033689931128504320ac^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{435860784217789708352064150011904a^2c^4 - 37798952372542130388333242572800a^3c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{125689625013172408450228398080a^4c^4 + 121529345073311549170957017600a^5c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-1608365550792559817000778240a^6c^4 - 194950142244868557545107200a^7c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & + \frac{637107780711474376536960a^8c^4 + 163748425957080676826400a^9c^4 + 1493431594810231002784a^{10}c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-47440971142616937600a^{11}c^4 - 945809930177706880a^{12}c^4 - 1334017390305600a^{13}c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{95861603597760a^{14}c^4 + 804681820800a^{15}c^4 + 1053761280a^{16}c^4 - 9266400a^{17}c^4 - 22880a^{18}c^4}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{719158411300311531099636149256192c^5 - 410571523995915103636086875750400ac^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{76922226282045321038610964807680a^2c^5 - 4759905419618101495650772254720a^3c^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-91541009546725018903225540608a^4c^5 + 14856333531397236429078528000a^5c^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{79555995059011570388889600a^6c^5 - 19002373448632656970567680a^7c^5 - 211519082541081104165376a^8c^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{9885489818128404480000a^9c^5 + 199298572335121459200a^{10}c^5 - 760046821634580480a^{11}c^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-46354224256564224a^{12}c^5 - 317096504524800a^{13}c^5 + 1048261294080a^{14}c^5 + 18265927680a^{15}c^5}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{50738688a^{16}c^5 + 14323158312130028577329998261248c^6 - 67354714614574469864027349319680ac^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{10013679548709395364542424580096a^2c^6 - 407217067356784296439429447680a^3c^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-19162092157753807819776714752a^4c^6 + 1175971721869850031714631680a^5c^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{25961486837375329264647168a^6c^6 - 1091502654319851356943360a^7c^6 - 27106423572193521908352a^8c^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{261340979417879961600a^9c^6 + 11399704637771946496a^{10}c^6 + 54707428968192000a^{11}c^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-1041432270278400a^{12}c^6 - 11778755788800a^{13}c^6 - 21825323520a^{14}c^6 + 138378240a^{15}c^6 + 384384a^{16}c^6}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{21897442348202927908870055526400c^7 - 8469990420374237328499518996480ac^7}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{984857404018118432128270073856a^2c^7 - 21920061664546677207230054400a^3c^7}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-2124517157114070032133980160a^4c^7 + 58163405180174141543055360a^5c^7}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{2562867476887975167246336a^6c^7 - 31794471289667294208000a^7c^7 - 1646165484870290841600a^8c^7}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-3895206459643699200a^9c^7 + 345920555949416448a^{10}c^7 + 3441118115635200a^{11}c^7 - 5064397578240a^{12}c^7}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-182659276800a^{13}c^7 - 579870720a^{14}c^7 + 2628890942114113155706088587264c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-832911098854149789917938974720ac^8 + 74145075437579324601900662784a^2c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-437726568302222735278080000a^3c^8 - 156057228920498547432960000a^4c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{1355312883557045188638720a^5c^8 + 148910005628350316393472a^6c^8 + 150900789359828851200a^7c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-58463402285728028160a^8c^8 - 538279236163468800a^9c^8 + 4975894741289472a^{10}c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{83847872908800a^{11}c^8 + 209358589440a^{12}c^8 - 1037836800a^{13}c^8 - 3294720a^{14}c^8}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{251846388794116547269521047552c^9 - 64915020664755348951583948800ac^9}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{4287983649636722959303311360a^2c^9 + 39574472683767144107212800a^3c^9}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-8062569524509534439342080a^4c^9 - 32718936462345289728000a^5c^9 + 5601660189917696819200a^6c^9}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{53785687957998796800a^7c^9 - 1194594603644682240a^8c^9 - 18507849744384000a^9c^9 - 1887028183040a^{10}c^9}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & + \frac{974182809600a^{11}c^9 + 3608084480a^{12}c^9 + 19467402316004035654842318848c^{10}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-4043815231452952828009512960ac^{10} + 189015906217258569078669312a^2c^{10}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{4607358366409816369397760a^3c^{10} - 296060780415937075675136a^4c^{10} - 4240849222765985955840a^5c^{10}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{135106373358731247616a^6c^{10} + 2320077411327836160a^7c^{10} - 10294377648242688a^8c^{10}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-327022836940800a^9c^{10} - 108816277248a^{10}c^{10} + 4428103680a^{11}c^{10} + 16400384a^{12}c^{10}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{1223023596769792930747514880c^{11} - 202206279433141015428464640ac^{11}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{6182609183365512202027008a^2c^{11} + 260258043611357931110400a^3c^{11} - 7508712106366929469440a^4c^{11}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-186391867126614589440a^5c^{11} + 1823351855054585856a^6c^{11} + 53712189141811200a^7c^{11}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{95151091875840a^8c^{11} - 3011110502400a^9c^{11} - 13382713344a^{10}c^{11} + 62694781719466010858225664c^{12}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-8119580786829010183127040ac^{12} + 139271375958900802060288a^2c^{12} + 9811112151976899379200a^3c^{12}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-117564282259024773120a^4c^{12} - 4946309333639331840a^5c^{12} + 3319818827759616a^6c^{12}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{733410710323200a^7c^{12} + 3304617738240a^8c^{12} - 11405721600a^9c^{12} - 50692096a^{10}c^{12}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{2624747198109976826478592c^{13} - 26088758666667744435200ac^{13} + 1602122810510215741440a^2c^{13}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{263645859078733824000a^3c^{13} - 567647397308006400a^4c^{13} - 85374710946201600a^5c^{13}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-340559171420160a^6c^{13} + 5558973235200a^7c^{13} + 30883184640a^8c^{13} + 89546632755225473056768c^{14}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-6652802659056353280000ac^{14} - 18195415529226240000a^2c^{14} + 510207763324646400a^3c^{14}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{20439447870504960a^4c^{14} - 941090852044800a^5c^{14} - 6023491092480a^6c^{14} + 18048614400a^7c^{14}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{100270080a^8c^{14} + 2475536182909715087360c^{15} - 132764965823557140480ac^{15} - 1289073129468985344a^2c^{15}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{69759819841536000a^3c^{15} + 548779484774400a^4c^{15} - 6035456655360a^5c^{15} - 44707086336a^6c^{15}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{54913761565825040384c^{16} - 2027452135275233280ac^{16} - 30376501355741184a^2c^{16} + 640781461094400a^3c^{16}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{6476812124160a^4c^{16} - 17146183680a^5c^{16} - 127008768a^6c^{16} + 962489983426363392c^{17}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-22860179649331200ac^{17} - 428122948239360a^2c^{17} + 3550268620800a^3c^{17} + 39447429120a^4c^{17}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{13019403075452928c^{18} - 179225808076800ac^{18} - 3781075927040a^2c^{18} + 8965324800a^3c^{18} + 99614720a^4c^{18}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{131018983997440c^{19} - 871995801600ac^{19} - 19377684480a^2c^{19} + 923023704064c^{20} - 1981808640ac^{20}}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} \\
 & + \frac{-44040192a^2c^{20} + 4060086272c^{21} + 8388608c^{22} - 19773629917121533265830925107200000a}{\Gamma\left(\frac{c+a+45}{2}\right)\Gamma\left(\frac{c-a}{2}\right)} + \frac{-19773629917121533265830925107200000a}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{22101814089954322012695824732160000a^2 - 8645930097341959090815097222656000a^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1436915791223683203685887230745600a^4 - 76825747007278493832081669000960a^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-4469890949975194461090414904896a^6 + 463748441630993553513658053600a^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{9803551748818568173643059520a^8 - 1085180644897115310947937600a^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-27135505486793616911917556a^{10} + 1075393731415013775314550a^{11} + 43891924491983169849390a^{12}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{-50983868140865907390a^{13} - 24626772606104649706a^{14} - 379365938967816900a^{15}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1207787566553260a^{16} + 90520079916420a^{17} + 905223092664a^{18} + 1233564750a^{19} - 36707770a^{20}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-250470a^{21} - 506a^{22} + 19773629917122657266558702714880000c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-58592201741454683765807227699200000ac + 42002654885057821285872597030912000a^2c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-12031689723062207211469984361932800a^3c + 1435301588237157579792800488942080a^4c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-32558506757823835612487868001920a^5c - 5898574866092339118144494244192a^6c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{234947340946005007031729522640a^7c + 14514991526180670634200826848a^8c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-391131070932933912359253600a^9c - 25051009887966498834464366a^{10}c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{74556980463383622627345a^{11}c + 20957910647978827212261a^{12}c + 289621206214422214275a^{13}c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-4289279955945740415a^{14}c - 148786619717764710a^{15}c - 1075644509341886a^{16}c + 828987994630a^{17}c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{177091734996a^{18}c + 937725525a^{19}c + 290697a^{20}c - 11385a^{21}c - 23a^{22}c}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{36490387651504510229890738421760000c^2 - 63070572094794242228037135237120000ac^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{33047147007986314304257789825843200a^2c^2 - 7148942386986288856922506656276480a^3c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{594958053228676143950096365436928a^4c^2 + 414019219197052258714251360000a^5c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-2646280971786830704938663251200a^6c^2 + 21921732812636735944551333120a^7c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{5744696200268233781588045184a^8c^2 + 4296108523792432094748000a^9c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-666601720855395636122320a^{10}c^2 - 95195226220409136238560a^{11}c^2 + 2753974170005883782672a^{12}c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{83288702776776868800a^{13}c^2 + 293090171438903520a^{14}c^2 - 14564200814412480a^{15}c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-208363562038368a^{16}c^2 - 623069172000a^{17}c^2 + 7027631600a^{18}c^2 + 60112800a^{19}c^2 + 133584a^{20}c^2}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{29713847307085136179653406359552000c^3 - 36853083360516413326198046235033600ac^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{14831391017621954353073139666616320a^2c^3 - 2442412280972004955585652928245760a^3c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{131636086236640988545669051047936a^4c^3 + 5528407396281674987965951722240a^5c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-590245839318642945091953960576a^6c^3 - 9197147325661184158537968000a^7c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1027004892686867951755550400a^8c^3 + 20462720700246442638087600a^9c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-720112656202721431786344a^{10}c^3 - 23477708103365796199920a^{11}c^3 + 23612907533349981704a^{12}c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{8320333804005880800a^{13}c^3 + 98110936377950320a^{14}c^3 - 218524115161440a^{15}c^3 - 11919116691504a^{16}c^3}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-78209485200a^{17}c^3 - 63320840a^{18}c^3 + 910800a^{19}c^3 + 2024a^{20}c^3 + 14400710284375171714577056609075200c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-13747629037608043593944715503861760ac^4 + 4343033941037643123462945611907072a^2c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-540751388203058172508609031577600a^3c^4 + 15589226144194638601333828751360a^4c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1633251163906294790208619276800a^5c^4 - 71635511678450646226321528320a^6c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & + \frac{-3064880356388385860733408000a^7c^4 + 88496964054774019935590400a^8c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{3996767738287303280215200a^9c^4 - 18128073461616777003488a^{10}c^4 - 2330195251475005200000a^{11}c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-23044531375719568000a^{12}c^4 + 31077745048971200a^{13}c^4 + 7228558886028480a^{14}c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{33962529744000a^{15}c^4 - 204570537600a^{16}c^4 - 2344399200a^{17}c^4 - 5788640a^{18}c^4}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{4706704565746779734698720820723712c^5 - 3569985704905121804049371092746240ac^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{892759832808222347464019637731328a^2c^5 - 82290673419357436561831796305920a^3c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{497935052028627114114790643712a^4c^5 + 266098624255979489174426530560a^5c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-3986706058133476179888217344a^6c^5 - 435823356108057808039793280a^7c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1772686588152473637256704a^8c^5 + 373575748782042421758000a^9c^5 + 3304170695625652160880a^{10}c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-109737072448206540480a^{11}c^5 - 2163370650185311424a^{12}c^5 - 2932862282269920a^{13}c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{220732431952032a^{14}c^5 + 1849176838080a^{15}c^5 + 2419230528a^{16}c^5 - 21312720a^{17}c^5 - 52624a^{18}c^5}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1111434389320628209672471009296384c^6 - 680346711498441130139114923622400ac^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{134695971623130951672563639418880a^2c^6 - 8824932575930347583677373399040a^3c^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-147848511653317704005603526656a^4c^6 + 27690834689733003342691737600a^5c^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{118726101800789346802498560a^6c^6 - 35988648401059939872967680a^7c^6 - 383460275826895456565376a^8c^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{18997367606103414528000a^9c^6 + 377347634342022023680a^{10}c^6 - 1502814952448409600a^{11}c^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-88777242526452480a^{12}c^6 - 605317621708800a^{13}c^6 + 2016947412480a^{14}c^6 + 35009694720a^{15}c^6}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{97249152a^{16}c^6 + 197996814889847097831964513665024c^7 - 98516005755630605774933067694080ac^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{15344272560607431912058294910976a^2c^7 - 661567648560649433595378524160a^3c^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-29135103957055914170945229824a^4c^7 + 1910500346812908635248988160a^5c^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{40389471772403079894038016a^6c^7 - 1795124854451925089533440a^7c^7 - 43637207543630846553408a^8c^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{437546884594297420800a^9c^7 + 18651614064798677248a^{10}c^7 + 88591535987834880a^{11}c^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-1714131968605056a^{12}c^7 - 19334899584000a^{13}c^7 - 35805369600a^{14}c^7 + 227335680a^{15}c^7 + 631488a^{16}c^7}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{27394604090672106182855800913920c^8 - 11099650892381034033674791157760ac^8}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1343127541435121900746331062272a^2c^8 - 32136088254467896730891059200a^3c^8}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-2916574220274407674059386880a^4c^8 + 84133344511060434674472960a^5c^8}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{3587898240875602719876096a^6c^8 - 46620485302706377920000a^7c^8 - 2345735175973016256000a^8c^8}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-5280765462234662400a^9c^8 + 497290387815277056a^{10}c^8 + 4929802637760000a^{11}c^8}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-7342310976000a^{12}c^8 - 262572710400a^{13}c^8 - 833564160a^{14}c^8 + 3004018987437464684444203876352c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-989128061426975918751244615680ac^9 + 91159331977254201052915204096a^2c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & + \frac{-644757881444057784139776000a^3c^9 - 193766776817818612008806400a^4c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1811616970660377121612800a^5c^9 + 187685371259530195617280a^6c^9 + 148565901069623980800a^7c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-74504952504027485440a^8c^9 - 681536675089670400a^9c^9 + 6378928324344576a^{10}c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{107054076729600a^{11}c^9 + 267199412480a^{12}c^9 - 1326124800a^{13}c^9 - 4209920a^{14}c^9}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{264824285337812391665309057024c^{10} - 70488075643416072714033561600ac^{10}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{4801456799564697036136120320a^2c^{10} + 40124109930639095996743680a^3c^{10}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-9113868742124014180302848a^4c^{10} - 33729723485185771929600a^5c^{10} + 6403336585088708362240a^6c^{10}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{60723242234638663680a^7c^{10} - 1375778045985767424a^8c^{10} - 21220542959616000a^9c^{10}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-1887930204160a^{10}c^{10} + 1120310231040a^{11}c^{10} + 4149297152a^{12}c^{10} + 18953362218523663243279335424c^{11}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-4044098676446145952497008640ac^{11} + 194395784585767354422263808a^2c^{11}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{4593611936120571283046400a^3c^{11} - 306804208185857766359040a^4c^{11} - 4320309367352846499840a^5c^{11}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{141168276212118511616a^6c^{11} + 2408675843483320320a^7c^{11} - 10838261144395776a^8c^{11}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-341625179750400a^9c^{11} - 1136410189824a^{10}c^{11} + 4629381120a^{11}c^{11} + 17145856a^{12}c^{11}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{1108158769771860426636656640c^{12} - 187361216531608727527096320ac^{12}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{5884301465669754228834304a^2c^{12} + 242887305777029509939200a^3c^{12} - 7181370904592378757120a^4c^{12}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-176501970510073528320a^5c^{12} + 1755837168635117568a^6c^{12} + 5133567017792000a^7c^{12}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{90416957030400a^8c^{12} - 2885647564800a^9c^{12} - 12825100288a^{10}c^{12} + 53098877592183875957686272c^{13}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-7005708158753820093972480ac^{13} + 123667114201103938093056a^2c^{13} + 8542636223131872460800a^3c^{13}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-104542767455474810880a^4c^{13} - 4350341611573493760a^5c^{13} + 3098297727565824a^6c^{13}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{648302093107200a^7c^{13} + 2920625111040a^8c^{13} - 10089676800a^9c^{13} - 44843008a^{10}c^{13}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{2085744482980925878042624c^{14} - 210504352266992222208000ac^{14} + 1352700350649375129600a^2c^{14}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{214563885594063667200a^3c^{14} - 482023211628625920a^4c^{14} - 69955707469824000a^5c^{14}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-278459704934400a^6c^{14} + 4566299443200a^7c^{14} + 25368330240a^8c^{14} + 66982609594422482960384c^{15}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{-5038502969274484654080ac^{15} - 13022410120867610624a^2c^{15} + 3891952035979591680a^3c^{15}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{15471730187108352a^4c^{15} - 720977170268160a^5c^{15} - 4614114902016a^6c^{15} + 13837271040a^7c^{15}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{76873728a^8c^{15} + 1748100600253550428160c^{16} - 94681091992049418240ac^{16} - 912596831518851072a^2c^{16}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{50024190925209600a^3c^{16} + 393149925949440a^4c^{16} - 4337984471040a^5c^{16} - 32133218304a^6c^{16}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{36699786322275991552c^{17} - 1365331479366205440ac^{17} - 20418429980639232a^2c^{17}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{433160508211200a^3c^{17} + 4377936199680a^4c^{17} - 11598888960a^5c^{17} - 85917696a^6c^{17}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{610160126296326144c^{18} - 14573359595520000ac^{18} - 272817324032000a^2c^{18} + 2268227174400a^3c^{18}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)}
 \end{aligned}$$

$$\begin{aligned}
 & + \frac{25202524160a^4c^{18} + 7844799776292864c^{19} - 108402809241600ac^{19} - 2286857748480a^2c^{19}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{5426380800a^3c^{19} + 60293120a^4c^{19} + 75172497326080c^{20} - 501397585920ac^{20} - 11142168576a^2c^{20}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} \\
 & + \frac{505111642112c^{21} - 1085276160ac^{21} - 24117248a^2c^{21} + 2122317824c^{22} + 4194304c^{23}}{\Gamma\left(\frac{c+a+46}{2}\right)\Gamma\left(\frac{c-a+1}{2}\right)} ] \quad (5)
 \end{aligned}$$

### III COMPUTATION OF THE MAIN RESULT

Putting  $b = -a-45$ ,  $z = \frac{1}{2}$  in known result (2), we get

$$(2a+45) {}_2F_1\left(a, -a-45; c; \frac{1}{2}\right) = a {}_2F_1\left(a+1, -a-45; c; \frac{1}{2}\right) + (a+45) {}_2F_1\left(a, -a-44; c; \frac{1}{2}\right)$$

Now using the established result of Ref [5], the main result is obtained.

### REFERENCES

1. Andrews, L.C. (1992); *Special Function of mathematics for Engineers, Second Edition*, McGraw-Hill Co Inc., New York.
2. 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.
3. Bells, Richard, Wong, Roderick; *Special Functions, A Graduate Text*. Cambridge Studies in Advanced Mathematics, 2010.
4. 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.
5. Salahuddin; Computation of a summation formula swing with contiguous relation, *Research Journal of Pure Algebra*, 2(2012), 98- 108.

**Source of support: Nil, Conflict of interest: None Declared.**

**[Copy right © 2019. This is an Open Access article distributed under the terms of the International Journal of Mathematical Archive (IJMA), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.]**