**A Summation Formula of Half Argument Influence with Recurrence Relation**

Salahuddin1\*

1P.D.M. College of Engineering, Bahadurgarh, Haryana, INDIA

\*Corresponding Addresses

[sludn@yahoo.com](mailto:sludn@yahoo.com) ; [vsludn@gmail.com](mailto:vsludn@gmail.com)

***Research Article***

***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.

**Introduction:**

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

AFB(,a2,…,aA;b1,b2,…bB;z ) = …(1)

where the parameters b1 , b2 , ….,bB 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) 2F1(a, b ; c; z) = a 2F1(a+1,b; c; z) - b 2F1(a,b+1; c; z) …(2)

**Recurrence relation is defined by**

Γ(ξ+1) **=** ξ Γ(ξ) …(3)

**Bailey summation theorem[Prud, p.491(7.3.7.3)**

2F1(a, 1-a ; ; ) = = …(4)

**Main Summation Formula:**

2F1(a, -a-40 ;; ) =[

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+ +

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+

+ ] (5)

**Derivations of main result:**

Putting b= -a-40 , z= in known result (2) , we get

(2a+40) 2F1(a, -a-40 ; c; ) = a 2F1(a+1,-a-40; c; ) + (a+40) 2F1(a,-a-39; c; )

Now involving the same parallel method of Ref [5], the main result is derived.

**References:**

1. Andrews, L.C., Special Function of mathematics for Engineers,Second Edition, McGraw-Hill Co Inc., New York, 1992.
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, 335-342, 2008.
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, Chaudhary, M.P ; A New Summation Formula Allied With Hypergeometric Function, Global Journal of Science Frontier Research,11,21- 37, 2010.