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ON CERTAIN CONTINUED FRACTIONS INVOLVING BASIC BILATERAL HYPERGEOMETRIC FUNCTION ${}_2\Psi_2$

Shyamli Gupta

Department of Mathematics,
Institute of Basic Science, Khandari Campus,
Dr. Bhim Rao Ambedkar University, Agra - 282004, U. P., INDIA

E-mail : shyamlig@gmail.com

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Abstract: In this paper we establish certain continued fractions representation for the ratio of two ${}_2\Psi_2$'s. We also discuss certain continued fraction representation for the ratio of two ${}_3\Psi_2$'s with two bases and ${}_4\Psi_3$'s with one base.

Keywords and Phrases: Basic bilateral hypergeometric series, continued fraction, basic hypergeometric series and poly-basic q-series.

2020 Mathematics Subject Classification: Primary 33D15, 33D65, Secondary 11A55.

1. Introduction

Since ancient time continued fractions have been playing a very important role in Number theory and Classical Analysis. The Indian mathematician Arya Bhatt (475-550 AD) used a continued fraction to solve a linear equation [9]. In the beginning of 20^{th} century, the theory of continued fractions got advancement due to the Indian genius Srinivasa Ramanujan. Chapter 12 of Ramanujan's second notebook [11] is entirely devoted to the study of continued fractions.

Various continued fractions representations for the ratio of two ${}_2\Psi_2$'s are known in the literature. A good number of them are established by Bhagirathi [2], Denis [5], Gupta [7], Pathak and Srivastava [10] and Srivastava [12]. The region of convergence of some of these collapses unless one of the denominator parameters is of the form $q^n (n \in N)$.