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A (p, q)-extension of Srivastava's triple hypergeometric function H_B and its properties

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Abstract

In this paper, we obtain a (p, q)-extension of Srivastava's triple hypergeometric function $H_B(\cdot)$, by using the extended Beta function $B_{p,q}(x, y)$ introduced by Choi *et al.* [Honam Math. J., **36** (2011) 357–385]. We give some of the main properties of this extended function, which include several integral representations involving Exton's hypergeometric function, the Mellin transform, a differential formula, recursion formulas and a bounded inequality. In addition, a new integral representation of the extended Srivastava triple hypergeometric function involving Laguerre polynomials is obtained.

MSC: 33C60; 33C70; 33C65; 33B15; 33C05; 33C45

Keywords: Gauss hypergeometric function; Srivastava's triple hypergeometric functions; Appell's hypergeometric functions; Exton's triple hypergeometric functions; Beta and Gamma functions; Eulerian integrals; Laguerre polynomials

1. Introduction and Preliminaries

In the present paper, we employ the following notations:

$$\mathbf{N} := \{1, 2, ...\}, \quad \mathbf{N}_0 := \mathbf{N} \cup \{0\}, \quad \mathbf{Z}_0^- := \mathbf{Z}^- \cup \{0\},$$

where the symbols $\mathbf{N}$ and $\mathbf{Z}$ denote the set of integer and natural numbers; as usual, the symbols $\mathbf{R}$ and $\mathbf{C}$ denote the set of real and complex numbers, respectively.

In the available literature, the hypergeometric series and its generalizations appear in various branches of mathematics associated with applications. A large number of triple hypergeometric functions have been introduced and investigated. The work of Srivastava and Karlsson [23, Chapter 3] provides a table of 205 distinct triple hypergeometric functions.