

Conjugate WP-Bailey pairs and transformation formulae for basic hypergeometric series

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Abstract: In this paper we shall make use of conjugate WP-Bailey pairs in order to establish transformation formulae for basic hypergeometric series.

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1. Introduction, Notations and Definitions:

For $|q| < 1$ and α real or complex, let

$$[\alpha; q]_n = (1 - \alpha)(1 - \alpha q) \dots (1 - \alpha q^{n-1}), \quad n \geq 1$$

and

$$[\alpha; q]_0 = 1.$$

Also,

$$[\alpha; q]_\infty = \prod_{n=0}^{\infty} (1 - \alpha q^n)$$

and

$$[\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_r; q]_n = [\alpha_1; q]_n [\alpha_2; q]_n [\alpha_3; q]_n \dots [\alpha_r; q]_n.$$

A basic hypergeometric function is defined as,

$${}_r\Phi_s \left[\begin{matrix} a_1, a_2, \dots, a_r; q; z \\ b_1, b_2, \dots, b_s \end{matrix} \right] = \sum_{n=0}^{\infty} \frac{[a_1, a_2, \dots, a_r; q]_n z^n}{[q, b_1, b_2, \dots, b_s; q]_n}, \quad (1.1)$$

convergent for $|z| < 1$ and $|q| < 1$.

Transformation formulae for basic hypergeometric functions play fundamental role