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On Dual WP Bailey Pairs and its Applications

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Abstract: In this paper, we have established certain transformation formulae for q-series by making use of dual WP-Bailey pairs.
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1. Introduction, Notations and Definitions

For $q, \lambda, \mu \in C$ $(|q| < 1)$, the basic (or q-) shifted factorial $(\lambda; q)_\mu$ is defined by

$$(\lambda; q)_\mu = \prod_{i=0}^{\infty} \frac{(1 - \lambda q^i)}{(1 - \lambda q^{\mu+i})}, \tag{1.1}$$

so that

$$(\lambda; q)_n = \begin{cases} 1, & (n = 0) \\ (1-\lambda)(1-\lambda q)...(1-\lambda q^{n-1}), & (n \in N) \end{cases} \tag{1.2}$$

and

$$(\lambda; q)_\infty = \prod_{i=0}^{\infty} (1 - \lambda q^i). \tag{1.3}$$

For convenience, we write

$$(a_1, a_2, ..., a_r; q)_n = (a_1; q)_n (a_2; q)_n ... (a_r; q)_n \tag{1.4}$$

and

$$(a_1, a_2, ..., a_r; q)_\infty = (a_1; q)_\infty (a_2; q)_\infty ... (a_r; q)_\infty \tag{1.5}$$

The basic (or q-) hypergeometric function ${}_r\Phi_s$ is defined by,

$${}_r\Phi_s \left[\begin{matrix} a_1, a_2, ..., a_r; q; z \\ b_1, b_2, ..., b_s \end{matrix} \right] = \sum_{n=0}^{\infty} (-1)^{n(1+s-r)} q^{(1+s-r)n(n-1)/2}$$